POPULAR AVIATION

Including SOUTHERN AVIATION and AERONAUTICS

A MAGAZINE FOR THE PROMOTION OF PRIVATE FLYING AND COMMERCIAL AVIATION

Volume XVIII MAY, 1936 Number 5

TABLE OF CONTENTS

FEATURE ARTICLES

An Airy Chat With the Editor 316
What the Designers Are Doing in Europe 318
Shooting With a Ten Lens Job 320
The Adventurous Bert Hall 321
Revolving Wing Airplane 323
Stunts With the Gates Circus 325
What Became of Capt. Ball? 326
Hunting Old Baldy the Killer 327
High-Lights and Side-Lights 329
Testing the Airline Pilots 331
Development of the Transports 333
Two New Aeronca Lightplanes 335
Al Williams—Man of Action 337
Mignet and the Pou du Ciel 339
Trying 'Em Out at Wright Field 341
Balloons and Balloonatics 343
Are Silent Propellers Possible? 345
Big News for P.A. Gas Modelists 349
What Our Readers Are Building 350
Gas Driven Model Planes 352
Building the New Aeronca Model 355

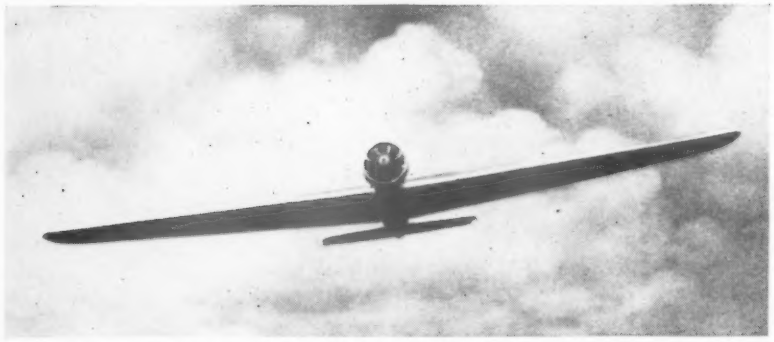
PICK OF THE BRIEFS

. . . and Chickens Come Home to Roost 322
The Stearman NS-1 Training Planes 322
The St. Louis Type PT-35 324
Pilots Are Subject to Eye Strain 324
Flight Course for Girls at Lake Erie 328
Calculating Speed at Ground Level 330
Burgess-Dunne Arrowhead 334
A New Whaddyecallit for the Army 340
The DeHavilland Hornet-Moth 340
A Nieuport Triplane 344
Gas Models in the Movies 360
Answers to Cross-Word Puzzle 360

Copyright, 1936
ZIFF-DAVIS PUBLISHING COMPANY

POPULAR AVIATION, Volume 18. Number 5. May, 1936. Published monthly by Ziff-Davis Publishing Company, at 608 South Dearborn Street, Chicago, U. S. A. William B. Ziff, Publisher; B. G. Davis, Editor; John B. Rathbun, Managing Editor. New York Office, 381 Fourth Ave., New York City. Subscription $2.50 per year, single copies, 25 cents; foreign postage, $1.00 per year extra. Contributors are especially advised to retain copy of their contributions, which must be accompanied by return postage. All such material will be handled with reasonable care, but this magazine assumes no responsibility for their safety. Any copy accepted is subject to revision or changes to meet the requirements of this publication. Payment for copy used will be made at our current rates. Photos and drawings will be considered as constituting a part of the manuscript in making payment unless otherwise specified. Entered as second class matter, January 24, 1933, at the Post Office, Chicago, Ill., under the act of March 3, 1879.

What the Designers Are Doing



Here is the new British "Mystery Plane" known as the Westland Geodetic, which has aroused intense interest in Europe. It is of the medium bomber class of a new type of construction that is said to be bullet proof.

by PIERRE MARIE
European Correspondent for
POPULAR AVIATION

EUROPEAN engineers and airplane builders, with the din of impending war in their ears, have been feverishly designing and building super-warplanes of high efficiency. A few photos of these new planes accompany this article and other photos and specifications will follow as soon as the information is released.

First, in interest, is the Type D.371 Dewoitine fighter which is entirely of metal with the exception of the fabric wing covering. Forty of these planes are now ready for delivery to the Lithuanian government and another series is under construction for the French Navy Air Corps. It is equipped with two 20-millimeter (0.80 inch) cannon and two machine guns.

This fighter is provided with a Gnome-Rhone Type KSF radial air-cooled engine 880 h.p., which gives it a maximum speed of 254 m.p.h. at an altitude of 13,000 feet. The rate of climb during the first six minutes is 2,740 feet per minute. The service ceiling is 36,100 feet. It is claimed that an altitude of 32,900 feet is attained in 19 minutes, 20 seconds.

The empty weight is 2,826 pounds, useful load 1,071 pounds and fully loaded weight, 3,824 pounds. The span is 37'-0".

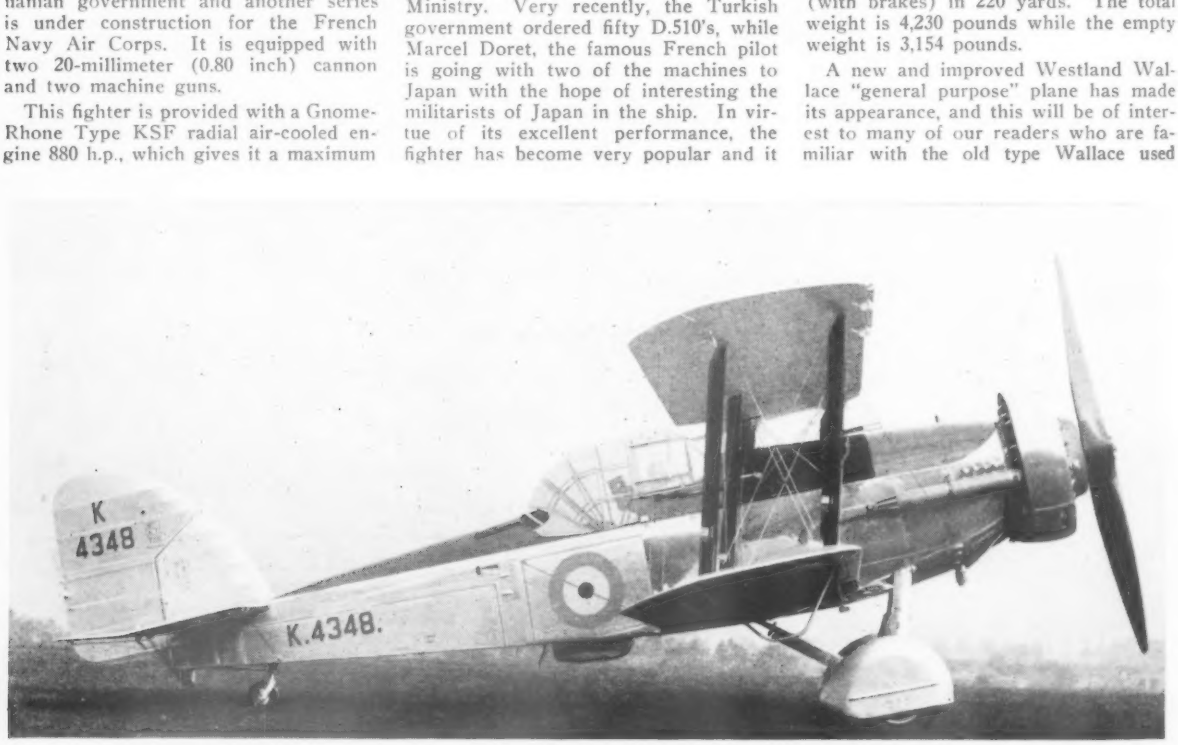
Another Dewoitine fighter is the Model D.510 of which three-hundred have been ordered by the French Air Ministry. Very recently, the Turkish government ordered fifty D.510's, while Marcel Doret, the famous French pilot is going with two of the machines to Japan with the hope of interesting the militarists of Japan in the ship. In virtue of its excellent performance, the fighter has become very popular and it is likely that many will be sold to other governments.

The D.510 is built entirely of metal and is powered with a Hispano Suiza water-cooled engine rated at 810 h.p. The maximum speed is 249 m.p.h. at 16,400 feet altitude and 242 h.p. at an altitude of 22,960 feet. The service ceiling is 34,440 feet.

This is also a fighter of the cannon type, provided with a 20 millimeter cannon mounted on the engine and two machine-guns in each half wing section. This gives the plane a great power of attack as ammunition is provided to the extent of sixty pounds for the cannon and three-hundred rounds for each of the guns.

Especial pains were taken in the design so that it could be handled in the small obstructed fields so often encountered under wartime conditions. The D.510 takes off in 175 yards and lands (with brakes) in 220 yards. The total weight is 4,230 pounds while the empty weight is 3,154 pounds.

A new and improved Westland Wallace "general purpose" plane has made its appearance, and this will be of interest to many of our readers who are familiar with the old type Wallace used



The new general purpose Westland Wallace biplane fitted with a Bristol Pegasus engine of 555 h.p.

In Army Airplane Improvement

This is the French Dewoitine D.371 fighter which is powered with a Gnome-Rhone 880 h.p. engine and which makes a maximum speed of 254 m.p.h.

by the British Royal Air Force that has proved unusually adaptable for varied military functions.

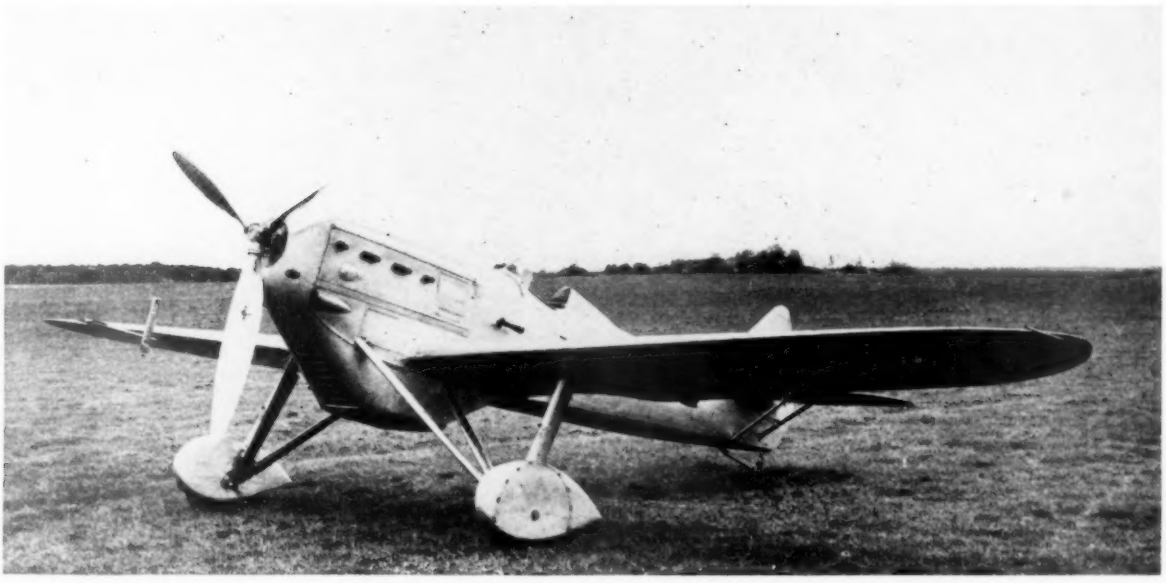
The Westland Wallace is powered with a Bristol Pegasus engine which develops 555 h.p. at an altitude of 4,000 feet. It is normally flown at a total weight of 5,500 pounds but, for special purposes, the load can be increased to 6,500 pounds. Many parts of the Wallace are interchangeable with the Westland "Wapiti" type, five-hundred of which are in service with the Royal Air Force at the present time, largely in Australia and South Africa.

A Lewis gun is provided in the observer's cockpit and a Vickers forward gun is installed in front of the forward cockpit. There is ample accommodation for the various classes of radio equipment, camera, etc., and the ship can also carry a fair load of bombs of different weights. Zipper type fasteners are used on the fuselage which greatly expediate inspection of the structure.

A most interesting plane is the British Bristol "142" bomber, a low-wing cantilever monoplane powered with two Bristol radial air-cooled engines of 605-645 h.p. each. It has a top speed of 265 m.p.h. at 13,000 feet altitude, but other performance figures are being withheld at the present time. It is constructed entirely of metal and has a disappearing landing gear, something quite new with European warplanes. The British Air Ministry has just ordered two-hundred of these planes under the classification of "medium weight bombers."

And then there is the much discussed Westland "Geodetic," a single-engined bomber of the medium weight class which, among other features is said to be bullet-proof. It is said that it can be riddled by shell fire without collapsing and that it needs no escort. It is named after its designer, Barnes Neville Wallace.

While shrouded with mystery, the fact has leaked out that it is designed particularly with an eye to rapid production and that the metal parts are so designed that they can be rapidly stamped out by any automobile manufacturer.



The Dewoitine D.510 which is now under intensive production in France. It is powered with a 810-h.p. Hispano-Suiza engine and has a maximum speed of 249 m.p.h.

Shooting With a Ten Lens Job

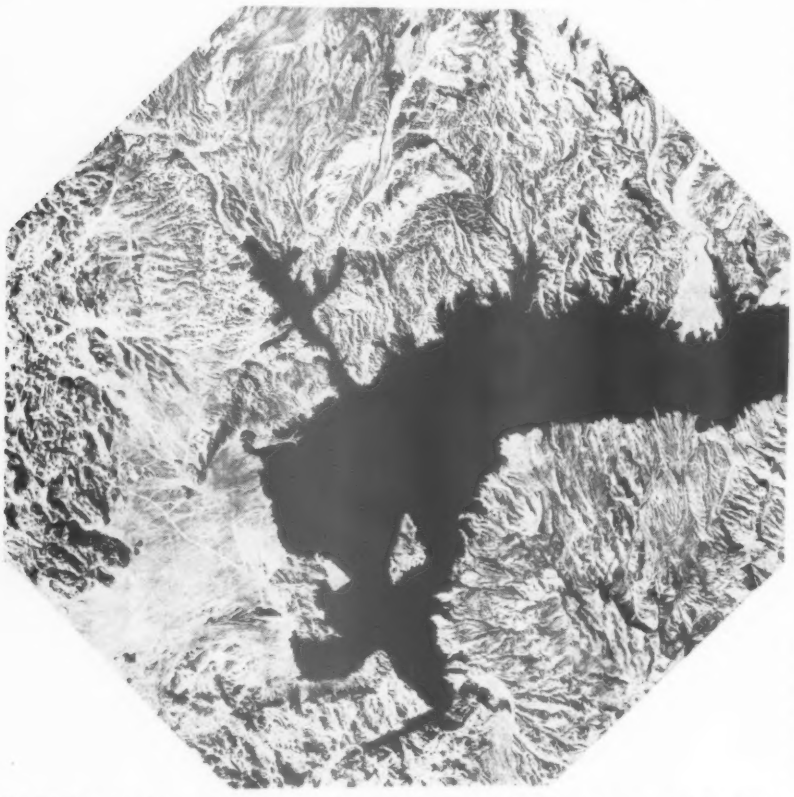
Here is a radical departure from the present miniature camera rage—a ten lens camera for survey work.

A HUGE 10-lens compound aerial camera has been recently produced by the Fairchild Aviation Corp., 62-10 Woodside Ave., Woodside, L. I., N. Y. It is believed that it is the largest aerial camera in the world if not the largest camera of any type ever built.

This camera weighs 340 pounds when loaded with ten rolls of special aero film sufficient for taking 200 octagonal pictures of the form shown herewith. Each picture measures 32x32 inches so that a great wealth of detail is obtainable. The assembly consists of two 5-lens cameras placed on a high precision adjustable mounting and all ten shutters are operated simultaneously by a single master control unit. The complete camera costs $26,000.00.

As an example of its work, the accompanying view of Boulder Dam and the Lake are shown here. The picture includes more than 200 square miles of area with each minute depression and elevation clearly shown. Fairchild Aerial Surveys, Los Angeles, Calif., recently completed the survey of the Boulder Dam district which was also made for the Soil Conservation Service.

This is the great Fairchild compound camera designed for aerial mapping. At one click of the shutters, an area of 760 square miles of ground can be recorded.



No, this is not a picture of a sun-spot. It is a photograph of Boulder dam and the lake taken by the Fairchild compound camera. More than 200 square miles of the terrain are included in this gigantic "snapshot."

Another snapshot was taken recently with the giant camera during the survey of Central New Mexico, for the Soil Conservation Service of the U. S. Department of Agriculture. A total of 353 square miles of ground surface was captured from an altitude of 25,600 feet above sea-level.

This camera was built specially for the big job in Central New Mexico, a survey that includes a total of 35,000 square miles. This is the largest aerial survey ever attempted in this country and one which will appeal to the imagination of aerial photographers throughout the world.

We have only to compare this camera with the aerial cameras employed during the World War, or ten years later for that matter, to realize the great advance that has been made in aerial photography. And a large part of this development and improvement must be credited to Fairchild. From a single lens camera that was not much more than a revamped view camera in 1918, we now have a machine with ten lenses that is capable of accurately mapping areas that can be expressed in square miles.

While the accompanying photo of Boulder dam suggests the great wealth of detail possible with this camera, yet we must remember that much has been lost in the engraving process and still more has been lost in the reduction. Using modern fine grain film and the new special developers, it is possible to make enlargements of the film to full thirty diameters and still obtain detail without grain.

The Adventurous Bert Hall

by JAMES FARBER

Stories of Bert Hall always carry a punch and a thrill, but the following story is more than usually entertaining because of certain new adventures that have not yet been released. Bert Hall is, by far, America's most colorful air-adventurer.

READERS, I give you Bert Hall, former Chief (and sole member) of the Bulgarian Air Force; Chief of the Air Force of the Sultan of Turkey; Lieutenant-pilot of the French Army; former *adjutant*, Escadrille Lafayette, and last and most impressively, General Chan of the Chinese Nationalist Army Air Force.

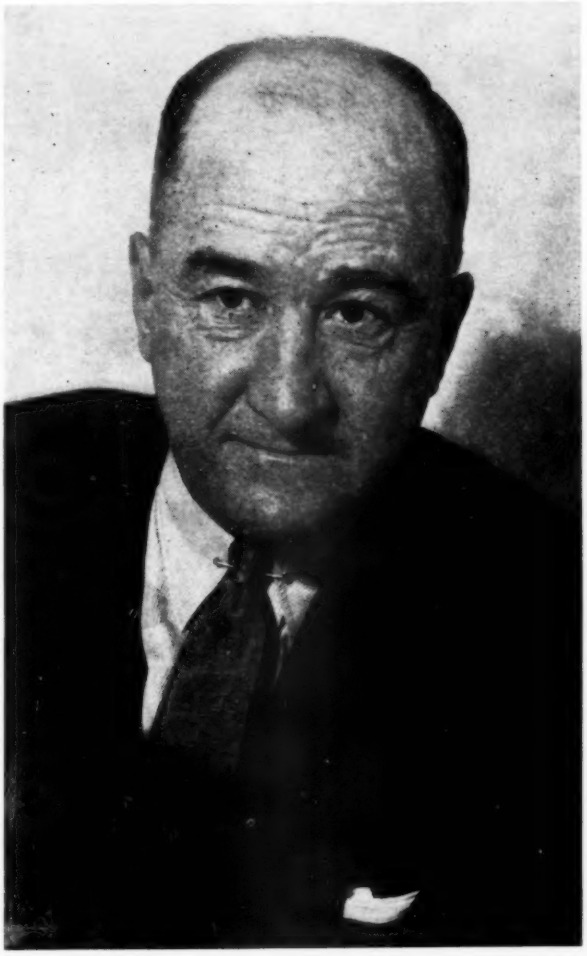
In writing of the careers of some men, one finds oneself confronted with very little of interest or importance. It thus becomes a painful task to assemble the crumbs into something resembling a literary tart, if you will forgive the metaphor. But in the cases of others, one is swamped with colorful and exciting and dramatic facts and one hardly knows where to begin.

Bert Hall falls into this latter category of men whose lives and deeds might make interminable reading, even if you had time. To give you, then, a tabloid record of the life and times of this canon of aviation, one is reluctantly forced to abandon many beautiful episodes. This, I trust, you will understand and forgive.

Bert comes by his streak of daring and wanderlust quite honestly. His father fought through the Civil War as a Confederate Missourian and when Grant received Lee's sword at Appomattox, Hall, Sr., went to Mexico where a pretender to the "throne," Maximilian, was finding that he had pretended himself into a real Mexican porridge of trouble. After missing Mexican firing squads several times and getting his fair share of trouble, he came back to Bowling Green, Ky., whereat was engendered the saga of Bert Hall, premier battle ace.

His family took him back to Missouri —to Higginsville, to be exact—and Bert first tasted excitement as a deck-hand on a Mississippi River steamboat. He found the call of the open road to his liking and from then on he was resolved to go places, see people and do things.

He began as a motor mechanic and shortly thereafter, an automobile race driver. In this introductory role to aeronautics, Bert went to France where he met Maurice and Henri Farman. They taught him to fly their early pushers. Louis Bleriot, flushed with the triumph of his immortal flight across the English channel, taught him how to fly a tractor plane. And Bert ate it up.



And here we have Bert Hall whose adventures are stranger than the wildest fiction in a pulpy. And his stirring adventures have not been confined to America but extend to every continent.

In 1913, Bert took his French mechanic, Andre Pierce and answered the war tocsin of Adul Hamid, Sultan of Turkey, who was about to bury the Ottoman scimitar into the entrails of as many Bulgarians as his armies could find. Bert sold the Sultan's viziers on the idea that "aeroplanes" had come to stay and that the Sultan could do no better for his army than to pay Bert Hall $100 in cash daily and in advance, for such reconnaissances and artillery fire directing as the weather and the Bulgars permitted.

It was a most profitable proposition—while it lasted. After the Turks welshed to the extent of a good 50 per cent of the contract price, Bert, who was the Sultan's sole air force, took "French leave" with the Sultan's one and only airplane and sat it down in the land of the Bulgars.

These sterling fellows were only too glad to have him. And for a while everything went well. Then the Bulgars began to welsh and one night as Bert was about to hop off for Turkey again, he was arrested and jailed. A drumhead court martial sentenced him to be shot at sunrise. He languished in a rat-infested room, certain he would meet the death of a spy. Then his mechanic showed up. He had bought off some influential Bulgarian officers and the firing squad party was called off. Even as Bert and Andre hopped off in their Bleriot, the blast of guns that executed six spies could be heard in the distance.

The declaration of war in 1914 found Bert in Paris doing his best to spend the proceeds of a prosperous European barnstorming tour which had its inception in Roumania and its climax in Russia. Much impressed with the spectacle of the world's second greatest republic girding itself for war, Bert enlisted in the Foreign Legion, serving as an infantryman until they let him transfer to the air service.

On March 14, 1916, the work of a committee of Americans was crowned with success. The Lafayette Escadrille was formed. Of the seven founders, Bert Hall is the sole survivor. Victor Chapman, Kiffin Rockwell, Norman Prince, Jim McConnell and Elliott Cowdin, the other founders, were killed. Bill Thaw died of pneumonia a few years ago. And, astonishing as it may seem, Hall and Bob Rockwell are the

only ones of the entire Escadrille, which numbered above 45, to be still flying. The death toll has been heavy among men who are still young.

Although the honor brought him no delight whatsoever, Bert Hall became famous in Special Mission work, which is the official term that covers anything from reconnaissance tours to spy planting. It was in the latter field that Bert made a name for himself.

It was his job to carry a spy over the German lines. Later on, being informed of the landing place by a carrier pigeon, it was up to Bert to get over there and pick up the spy. He made a number of round trips in this hazardous service until he just missed setting his Morane in the middle of an ambush. The Germans opened fire on him a little too soon—but not too soon to riddle his plane as he made his getaway. Bert will tell you to this day he believes his spy was in the German service, too.

Meanwhile he was getting his fair share, not only of routine patrol work but of individual and unit combat with the enemy. One day, flying as a single patrol inside the German lines between Rheims and Machault, Bert met one of the newer type E.A. It was fast, trim and inviting to the Kentuckian. He decided to play around a while, size up his chances and then wade in for a fight. At 14,000 feet the two jockeyed around, the German seeming to enjoy flying rings around Bert in his 13-meter Nieu-

Without warning the former executed a neat bank, climbed swiftly and threw, of all things, a hand grenade at his astonished opponent. It went wild. He repeated his maneuver several times, getting into what he conceived to be accurate "pitching" distance and tossing a hand bomb at his still surprised foe. Bert likes to tell the story. He says he made no effort to get on the German's tail even though several times he saw an opening. He preferred to watch developments. And they came.

Whether, as Bert surmises, the German's hand struck the top wing thus causing him to drop the bomb, or whether his coat was caught someway, the fact was evident that he had dropped the deadly pineapple in the cockpit.

And Bert had watched him pull the fuse pin!

Still incapable of taking advantage of the situation—knowing that in six seconds the unfortunate pilot would be in eternity—Bert followed the German as he fell out of control. Just before the sixth second the German's head appeared in view. He had apparently resigned himself to the inevitable. Just before the explosion, he raised his hand in a smart salute!

On another occasion, however, Bert, got into a scrap with three E.A.—and didn't come out of it so well. Under orders to make a triangular patrol over Fort Douaumont, Fort Veaux and Hill 304 (Dead Man's Hill, if you recall the desperate fighting in that area) and looking for trouble, he found it in a fast

(*Concluded on page 378*)

. . . . and Chickens Come Home to Roost

Here's the war weary old Nieuport that staggered home after a good beating on the Western Front.

PILOTS of the Air Corps frequently state that anti-aircraft fire is ineffective, but here's a photo that rather disproves their claim to immunity. The archies sure mussed up this old bird but she staggered home for all that.

This photo, an official photo by the U. S. Signal Corps, taken "somewhere in France," is an authentic view of a Nieuport that actually arrived home after flying into a bunch of shrapnel. Her prop is practically negligible, as one might jolly well say; her right wing-tip has been severely strafed while the spars in the lower left wing are definitely snapped off near the body. Very fortunately, the landing-gear remained intact which was the only piece of good luck that this pilot had.

The Stearman NS-1 Training Planes

CONSTRUCTION of 61 Model NS-1 primary training planes for the United States Navy was recently completed by the Stearman Aircraft Company, Wichita, Kansas, a subsidiary of the Boeing Airplane Company. Three of these planes will also be supplied to the Philippine Government for the use of the Philippine Constabulary.

The navy two-seater biplanes are equipped with 235-horsepower Wright Whirlwind engines, but the planes for the Philippine Government will be supplied with 225-horsepower Lycoming engines, although the latter are similar to the Navy machines in every other respect.

In addition to these orders, Stearman has a contract for 26 primary trainers for the U. S. Army Air Corps which will be completed during the summer and early fall. These army trainers will be the same as the NS-1 trainers with the exception of the finish and a few minor details.

There is probably no machine in the service that is subjected to more abuse and rough treatment than a primary training plane and, contrary to the opinion of many of our readers, no more difficult machine to design.

A part of the 61 Model NS-1 Stearman training planes lined up "at attention" at the Naval Air Training Station, Pensacola, Fla.

A Revolving Wing Airplane

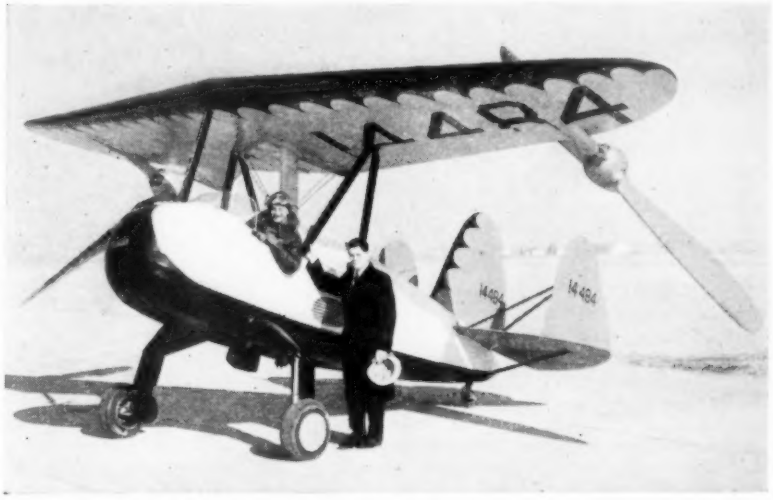
by EMORY F. SCOTT

A very novel type of airplane that has flown successfully and which shows evidence of future popularity. It is based upon an entirely new principle of flight which has been proved to be basically sound.

AND here, friend reader, is a ship without a propeller. It has covered wings that rotate and change their angle, giving it lift as well as forward motion. It makes less noise and the engine is out of sight. And, what's more, it is not merely a neat looking job but it also flies successfully.

It seems that anyone who pokes fun at an eccentric idea in aeronautics these days is liable to be laughing out of the other side of his mouth in a short time. The rigid engineering principles and traditions that we have followed for so long in aeronautics, are proving themselves to be as narrow minded as the superstitious beliefs of past generations. However, any inventor who attempts to depart from the "kite principle" in flying, can expect little sympathy from even the most highly regarded aeronautical engineers of today.

Such was the predicament that the Lewis American Airways, Denver, Colorado, found themselves in when they visioned an airplane without a propeller. Due to the fact that it was necessary for them to sell stock to build their plane, they reasoned that it would be wise to compromise with their principle with the conventional type of airplane construction, and vary from it as little as possible.



A three-quarter front view of the revolving wing airplane with the inventor, Paul M. Lewis standing beside it and the pilot, Garland P. Peed in the cockpit. Note the giant propellers mounted at the wing tips. The engine is enclosed just aft of the pilot in the fuselage.

Side view of the Lewis revolving wing airplane showing the tremendous area of the propeller and the unusual position of the engine just behind the cockpit. The ship offers all the visibility inherent with a pusher type plane while, at the same time, the engine is out of the wind-stream

The main purpose in their minds was to gain the confidence of pilots and engineers. This seemed to help the cause very little, however, for their theories were ridiculed at every hand.

They could not, the so-called authorities reasoned, fly a ship with only the large linen covered rotating wings. The rotating wings, they were told, would burst and go into a thousand pieces. Also, among other things, that changing the angle of these "wings" would set up a tremendous vibration so that they would have no vertical lift, no speed; and lastly, that the engine being placed inside of the fuselage would overheat.

The Lewis plane, as originally designed, was to be constructed practically without stationary wings. It was to have four paddles or rotating wings instead of the two as shown in the completed craft. Two of these paddles, mounted on struts or brackets above and at each side of the fuselage, were to provide lift as well as forward motion. Each paddle had opposing blades fixed on a common shaft and at an angle of ninety degrees with each other.

As each blade completed a revolution, it accomplished a double purpose. By means of an automatic adjustment, the angle of the blades was altered at each half revolution. In other words, as the blade started its downstroke, it changed

to almost lateral or flat position, giving the plane a lifting effect.

Upon completing its half circle, the blade angle was then made equal to the pitch of a propeller, for its upstroke, having a propelling effect, or forcing the ship forward. Thus, when the blade lifted on one end of the paddle, in its downstroke, the opposite end was propelling on its upstroke. This explanation is merely given to explain the theory involved.

When the plane was finally completed and flown, however, it had a somewhat different appearance. As shown in the accompanying illustrations, the ship now resembles the conventional design, except that it is without a propeller in the nose and has, in addition, the revolving "wings".

The fuel tanks are in the nose of the ship while the motor, a 215 h.p. Lycoming, is mounted just behind the cockpit, its cylinders in a horizontal position, as shown in the construction photo. Perforated sections of the fuselage covering afford ample cooling facilities, while the exhaust stack is thrust from the belly of the ship.

A connecting shaft, extended from the motor upward, drives a geared mechanism enclosed in the parasol wing. This, in turn, revolves the paddles at the trailing edge of the airfoil, in addition to changing their angle at each half revolution.

The controls are so arranged that the "angle changing" mechanism may be altered from the cockpit, making possible an aileron principle for lateral control. Or, in other words, each side of the ship is also separately controlled, so that tilt may be created, merely by increasing the "lift" on one side, and decreasing it on the opposite wing.

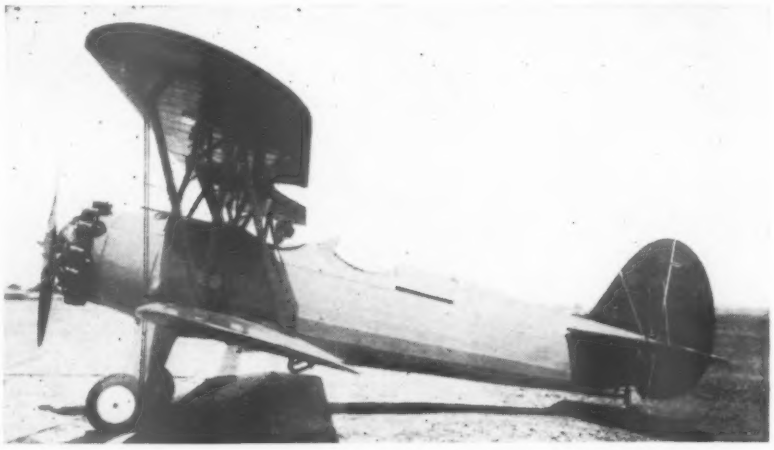
According to the builders, the plane rides upon these paddles, or rotating wings and then only upon the ones that are driving downward. Thus, it is explained, that the weight is on the revolving wings, the wings are upon the air and the air is thus made the roadbed. The roadbed is inclined downward. The lift is at right angles to the lower surface of the rotating wings, thereby eliminating drag, except for the skin friction encountered by the surface of the plane.

Numerous changes were made in the design, until the plane was completely assembled and ready for its test flight, as may be found by comparing the two accompanying photographs. It was found that the larger revolving wings, as shown in the unfinished job, would require a considerable speed reduction in respect to the regular speed of the motor. The revolving wings attached to the finished plane are much smaller, having a gear ratio of 1 to 6 in relation to the motor speed.

In order to insure greater stability and provide for better maneuverability, the tail assembly was strengthened considerably on the completed ship. This was accomplished by providing larger elevators and a triple fin and rudder assembly.

(*Concluded on page 376*)

The St. Louis Military Type PT-35



The side elevation of the St. Louis PT-35 shows a staunch sturdy construction that is in keeping with its purpose.

A NEW military training plane has recently been designed and constructed by The St. Louis Aircraft Corporation, formerly the designers and builders of the Cardinal monoplane. The production of the Cardinal has been discontinued, and the company is now devoting its attention to military types.

The Model PT-35 was one of the competitive types entered in the recent bids for U. S. Army Air Corps trainer contracts. This contract was later awarded to the Stearman Aircraft Corporation for a modified version of the Model NS-1 trainer recently built for the U. S. Navy.

Performance figures are being withheld at present, as well as the constructional features, but it is known that the recently developed 225-horsepower Wright Whirlwind R-760-ET is used in the St. Louis ship

Front elevation of the St. Louis PT-35 biplane, a military primary trainer.

Pilots Are Subject to Eye-Strain

BLIND flying, which has been developed to the point where it is an established part of modern aviation, has brought with it its own problem—the problem of eye strain.

The pilot must focus his eyes on the horizon line or some other far distant object. He must try from time to time to pierce the clouds and storm and catch the light of a beacon or landing field.

He must quickly shift his eyes from these objects miles distant to objects two or three feet from his face. Constant looking and concentrating of sight bring muscular fatigue, and now experts are working out the correct color and size for an instrument board.

Oculists at Johns Hopkins University's famous medical school have completed a series of studies to fix the size of the figures and the dancing indicators on the dials to relieve the strain from changing focus as much as possible.

Their recommendations are being followed by several builders of planes. These include placing the artificial horizon and other instruments of stability high above the instrument panel against the window in front of the pilot, a novel feature in instrument installation.

Stunts With the Gates Circus

by JOSEPH R. JAMES
Transport Pilot No. 56

Here is the beginning of a number of Gates Circus stories by one of the pilots of that early but wonderful organization who gives first-hand dope on the thrills and adventure of a travelling air-circus.

IT doesn't seem possible that only nine years ago the Gates Flying Circus was charming the people of the country into general acclaim and aviation hysterics.

Today, the air traveler, accustomed to his streamlined ships and home-like comforts aboard the big transports, boarding casually the China Clipper for a Hawaiian dash, or soaring down to Panama for a brief holiday, would look with horror upon those early crates, the Jennies and the Standards, with which the Gates Circus had taught him the joy of flying.

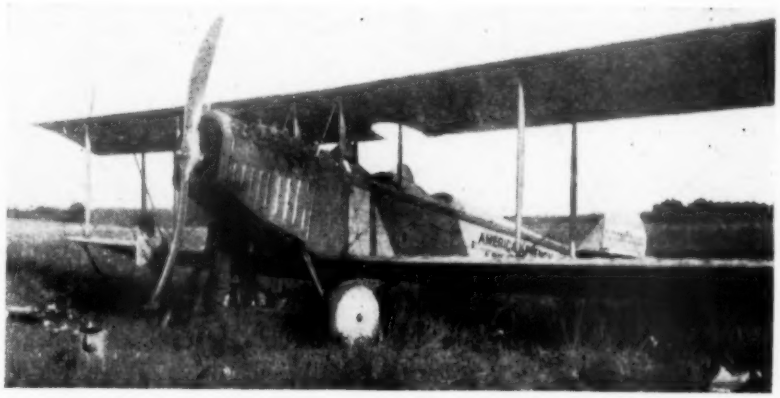
But, more than anything else, aviation owes its present success to that gallant pioneer, the barnstormer, welded together in a supreme unit of showmanship and courage under the guidance of Major Ivan Gates. Eleven shabby but always arrogant young eagles, wearing the crimson banner of the Gates Flying Circus, flamed across the continent in those turbulent years and carved out heartbreaking, but necessary aviation history.

Early in June, 1927, I was debating the future of aviation with a group of barnstorming pilots on the Eagle Flying Field, Elmhurst, Ill. For three years this roadside airport had furnished me with a comfortable income and the carefree interesting existence of a commercial pilot. But the flight of Col. Charles Lindbergh somehow made all the incidents that had hitherto provided an occasional thrill, seem tame, like a kid's game of war played with dummies.

We were eager to explore new horizons and so, when the telegram arrived in the middle of our incoherent debate, asking me to join the Gates Flying Circus, I knew the answer to a pilot's prayer. Only a year before I had missed out on this same golden opportunity because of the temperamental C-6 motor suddenly developing a cracked valve seat that could not be repaired in time. But now there was nothing to stop me. I gave the old Oriole one long farewell look, leaving it tied to a fence in the great outdoors, and dashed off for home to pack. Hangars were as unknown as cellophane bathing suits in those days.

The Gates Flying Circus! It spelled the ultimate in achievement for any barnstormer in the country. As I packed furiously, the words of the Major's message were burned into my memory. "Join us at Teterboro field. Stop. Fifty dollars a week and expenses guaranteed." I whistled an old army song badly off key and shouted, "Circus, here I Come!"

Any pilot suffers on a long train ride and I was no exception. When I arrived at Lodi, N. J., where the Gates Flying Circus shops were located, I saw at a glance that word "shops" was flattering to say the least. There was nothing but a great old red barn sadly lacking in repair and decorated with the bold white lettering of "Gates Flying Circus, Greatest Aviators in the World." At least the lettering was not exaggerated, I confided to myself and turned to meet the first of the outfit, Johnny Runger.



And here is old Jenny again, out on the cow-pasture and ready for business—as usual.

Johnny was a stocky cheerful youngster who later turned out to be a hair-raising and successful parachute jumper. His engaging smile helped to wipe away any misgivings I might have had regarding the circus "shops." Looking about, I saw old wings of doubtful make, fuselage in all stages of repair and lack of it, Hispano-Suiza, Liberty and rotary motors and parts scattered all over the landscape.

Signs of feverish activity were in evidence and then, Johnny led me to a small office among the debris, built mostly out of wing spars and old airplane covering. A man in his early forties, blond, grizzled, about five-feet seven-inches and powerfully built, swung around from his desk to greet me. It was Ivan Gates, high potentate and general manager of the circus, known by his daredevils as "The Pope."

When I remember him now and that first meeting, mumbling something deprecating about my ice-cream suit and ordering me to get into overalls and build up my own ship right away, I am reminded that all pioneers must know death before history will give them a grudging recognition. A happy landing, wherever you are, Pope!

I walked over to my ship, an uncovered skeleton of a J-1 Standard fuselage, and without any further ceremony pulled on my jumper and spent the rest of the day assembling and inspecting it.

That night, I met other members of the circus at the local Y. M. C. A. Among them was Major Lee Mason and Bill Brooks, intrepid and two of the most interesting characters I have ever met. Both men had just returned from Nicaragua at the request of the U. S. Marines. Those two gentlemen, each a proud possessor of a Hisso-Swallow, composed the entire air force of the "Federalistas" and, until ordered out of Nicaragua, were busy bombing the "enemy" with bottles of ammonia in lieu of gas bombs.

There were also Ives McKinney, Warren Smith, Buckey Steele and Bill Stultz, the boy who started Amelia Earhart on the road to fame and fortune by flying her to England in a pontoon equipped Fokker. Ives McKinney was a slender dark complexioned man of thirty from Oregon. Warren Smith, his inseparable pal, was a tall rawboned blonde giant with a perpetual grin that would explode unexpectedly into the most contagious laughter. Smith, at present, is chief pilot for Pan-American-Grace Airways at Santiago, Chile.

Bucky Steele was a small dark-eyed good looking lad from Georgia, and what he couldn't do to a girl's heart with his antics in the air, he made up with his long lashes and his southern accent. Everyone of these chaps was expert in handling his clumsy old crate, ready to fly in any kind of exhibition on a minute's notice. There was never a happier healthier more expert crew of pilots assembled anywhere.

"Pope," at that time, was busy arranging details and publicity for what he called the "Greater New York Air Show" which was to take place on Teterboro Airport in three weeks. For his able assistant he had George Dawes,

a former newspaper man who could publicize an ordinary nose-dive into national headlines.

With my ship nearing completion the circus, including the absent Clyde Pangborn, consisted of eleven ships and as many pilots. Pangborn, chief pilot and co-owner of the outfit, was doing some special work for the Texaco company and was due back in time for the scheduled air show.

At last my ship was completed, with a "good" Hisso in the nose, new covering tight as a drum and the freshly painted red enamel glistening in the sun as the ship was hauled to the airport to be assembled, rigged and test flown. On each side of the fuselage we carried a bold white sign of the Texaco company who provided us with free gas and oil.

My ship was finally rigged, checked, filled with gas, oil and water and pronounced ready for a test-hop. As I took off, I could not help but feel a part of this clumsy old ship, which at that time was as good a ship as any barnstormer could desire. It climbed steeply, responded to controls normally, the rigging was balanced and the motor barked steadily on both banks of the Hisso.

After reaching 3,000 feet I started a loop. As it went over on its back, the motor quit and stayed quit after the loop was completed. I glided to a nearby polo grounds and after landing, started the motor by cranking. Again I went up to 3,000 feet, went through another loop and back to the polo field for another forced landing with a dead motor.

This performance, repeated three times, convinced me that something must be haywire in the center-section gas tank. After removing the tank we discovered a piece of rubber hose about a foot long, partly deteriorated. After a thorough cleaning of the gas tank the ship was taken up again and the motor kept purring sweetly through all maneuvers.

It was only four days now from the eventful week-end of our highly publicized air show and all ships and pilots were on line, receiving final check and instructions. Pangborn, our chief in charge of all flying matters, was expected that afternoon. Sure enough, a red clipped-wing Standard zoomed in from the West.

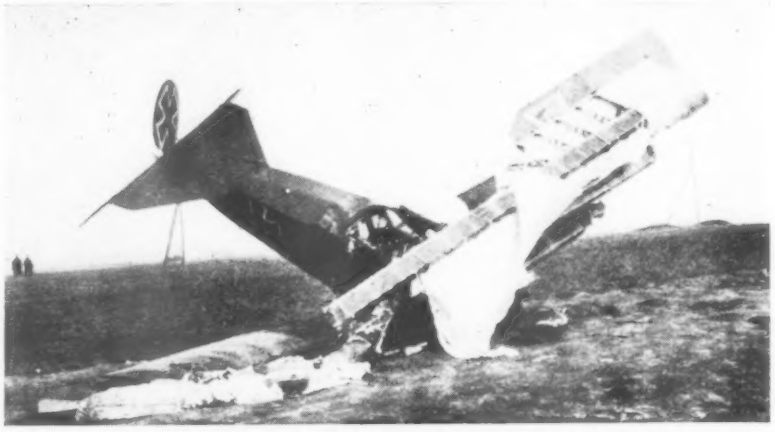
Every member of the circus was anxiously watching his chief make a beautiful landing and taxi up to the line of his ships. I saw a tall good-looking muscular and well-proportioned blonde youth get out of the front cockpit. It was Aaron Krantz, billed as "Diavolo" Krantz, the greatest stunt man in aviation.

As I shook hands with Pangborn, I shall never forget his steady penetrating grey eyes and his serious mien. He had very little to say but I knew that this expert pilot would watch my every move. At that time he was about thirty years old, lean, wiry and blonde.

(*Continued on page 372*)

What Became of Captain Ball?

by W. J. BOYLHART



Lothar von Richthofen's crashed triplane which was forced down on May 5, or May 7, 1917.

ON May 7, 1917, a British S.E. 5 disappeared among the evening rain clouds above Annoeullin. Thus, did Captain Albert Ball disappear from the eyes of his squadron mates.

Capt. C. M. Crowe of Ball's own squadron, number 56, reported him flying eastward in pursuit of a German single-seater until both disappeared into the clouds. Capt. Crowe followed and, on emerging from the clouds, he could see neither Ball's S.E. 5 nor the German machine.

Capt. Ball did not return that night nor the next day. He was listed as missing. Some still believe him alive but his squadron felt that he was dead for he had said that he would never be captured alive. No word was received from the Germans until more than three weeks later. This was unusual as the death of a flyer so well known as Ball would have been made public at once. At the end of May the German Air Service dropped a note:

"R. F. C. Captain Ball was brought down in an air fight on May 7th by a pilot who was of the same order as himself. He was buried at Annoeullin."

This was all the information that was received. How was Ball killed and by whom?

The Germans give the credit to Lothar von Richthofen, the brother of the great Baron von Richthofen. This has been much disputed and rightly so. Let us look at Lothar's combat report. He lists the place as Annoeullin and the victim as Capt. Ball. He also supplies the number of the S.E. 5's engine —10046 Hispano-Suiza. Please note the following report of von Richthofen's, and note that Ball was flying a S.E. 5 which was a biplane and could easily be recognized as such.

"On May 7th I had a combat with many triplanes. One of them attacked me in a very determined manner. We fired a great deal at each other, and during the combat he came very close. He came down under my fire. My machine was damaged, and I landed with a dead propeller, near the hostile machine." (Richthofen was seriously wounded).

In order to receive credit for a victory, a German flyer had to produce three witnesses. This was an important rule and without it there was no credit for the victorious combat. Richthofen not only provides the three required witnesses but also a fourth. They were:

1. Lieutenant Hepner. Abteilung I (Kite-balloon).
   Saw a triplane fall out of control.
2. Lieutenant Hailer. Flieger-Abteilung 29.2.
3. Anti-aircraft Group 22 (Flakgrupper).
   Saw a triplane shot down.
4. Kite-balloon Section 22.
   Saw an English machine crash near Annoeullin, and saw the German machine land near Bauvin. (1½ miles away.)

Lothar von Richthofen and two of the witnesses state that the machine was a triplane. This might be excused in the ground officers, but cannot for Lt. Hepner who was in the air at the time. Lothar was an experienced flyer and was well acquainted with the differences of biplane from triplane. The S.E. 5 was at that time a new type and its wreckage might have been mistaken for that of a triplane. However that does not effect the statements of the witnesses, who observed it in the air. It is possible that the Germans changed the facts for propaganda purposes. It would be well worth it to have one of their foremost aces credited with Ball's death.

Capt. Hunter, an American, was shot down some days previous to Ball's death. He was in a German hospital during May in the Lens district. He had been visited by a German officer in regard to Allied gun positions, about which the Germans thought Hunter could give information. On May 8th,

(*Concluded on page 376*)

Hunting Old Baldy the Killer

by T. R. WISEMAN

Hunting bald eagles by airplane is a novel adventure, and a thrilling one too. This, we believe is the first time that such an exploit has been published and we are sure that you will find it of deep interest.

I DIDN'T want to do it. It was one of those jobs where you can feel death brushing past you in the propeller blast. Mountain flying is safe enough, if you stay up near the ceiling and keep out of canons and places where the down-draft or an unexpected wind current might get you.

I was running a short-line mail route from Marfa, Texas, to Pecos—over about ninety miles of the Davis Mountains and my ship was the only asset I had. I'd flown through about half of the depression so far, but my little game was feeling the pinch.

So, when Bill Bliss—the craziest specimen of flying man who ever sprouted wings—came into the airport office one day and told me he'd found a swell way to make some money, I had a hunch there'd be something wrong with it. There was! Bill had been having his own troubles. His Dad is a rancher, down on the southwestern Texas border, and he had been bothered a lot with a "widower eagle" as they called old Baldy.

Courtesy of the Field Museum

A specimen of the American Bald Eagle, the bird chosen by our government as a symbol of fearlessness, strength and freedom.

There's an idea that eagles are a noble bird and I guess they are—in some ways. I know it's a crime to shoot them in some parts of the country. But down in this part of Texas there is a hundred dollars bounty for a dead eagle.

Although they eat rodents, small wild game and birds, once they taste young lamb or veal they prefer a diet of cultivated meat. A widower bird, like old Baldy, who has lost his mate or who has been injured and recovered, is like a vengeful Satan. Sometimes, one eagle will kill as many as twenty animals in a single day.

Bill—who owned a nice little Curtiss Robin until he nosed it over into a canon, showing his girl friend some barrel-rolls, wanted to try killing this widower bird from the air and in my plane. He had been snipping old Baldy from horseback, but the eagle's sense of smell and his extremely keen eyesight had spoiled Bill's plans.

I've known Bill a long time and know he's a great kidder, so I didn't swallow the story whole.

"Now Bill, no eagle's got enough sense to leave live bait-meat alone!" I protested.

"Tim, I'm tellin' you Gospel truth! Old Baldy has more sense than most human beings. He sure enough found out I was hidden in the rocks with my gun, because the rabbit couldn't run far, I reckon. Baldy hovered for half or three-quarters of a day without pouncin' at all. An' when he did, he came so close to clawin' me that it wasn't funny. His eyes were yellow, like a tiger cat's eyes, just glarin' hate. I'll bet he hates humans 'cause we killed his mate—an' that's why he's killin' everything he can reach, whether he can eat it or not."

"But Bill, it's worth more than a hundred dollars to me to take a chance of cracking up in one of those canons, just so you can kill one murderin' eagle."

"I tell you Tim—" he begged me—"It's come to a point where we've got to kill the eagle or go out of the ranch business. Dad'll pay expenses even if you don't get any birds. If you do, we'll share up the dividends after the costs are taken out."

Bill's a good scout even if he is a dare-devil and what's more, he's an A-1 shot. I was tempted by the idea, I might as well admit, but I couldn't see much chance of getting any birds. Moreover, my ship was the only asset I had kept clear and a wrecked plane doesn't sprout any wings. "I'll think it over, Bill," I told him, more to avoid a definite refusal than because I intended to do any such stunt.

I looked around in the library at El Paso, however, to see what they had about eagles. After I'd read some of the information, I looked up meteorological reports on wind currents. You can see that I was weakening. Bill and I took a couple of horseback rides into the district to study conditions and to make contact with some of the other ranchers in this section.

The books all say the biggest eagle family is the one to which old Baldy belongs. These birds can fly about seventy to eighty miles per hour and are capable of checking their speed instantly in making a kill. In my mail route to Pecos, I started to watch for eagle nests, and noted the air currents and other flight detail information in some of the country we'd be likely to cover.

All told, I guess, there are more bald eagles than any other kind in that part of Texas. There are two other species, however, and I met many of the smaller ones—golden eagles with a wing spread of four and four and a half feet.

The Mexican birds are the next largest and run as large as six feet from wing-tip to wing-tip. The more I studied eagles, the more I realized we'd have a job on our hands if we really set out to kill old "Baldy."

On one of these mail trips, when I was alone, I met a big bald-headed fellow. He was used to being the biggest bird in the country and thought he had the right-of-way, I guess. I expected him to veer off, as he was dead ahead, so I tried to dive my ship under him.

The bird got caught in the slipstream and had his feathers shaved off a little.

XUM

He went screaming off, more insulted than hurt and as I wasn't prepared for hunting, I thought I'd take this chance to watch his flight tactics. I circled for altitude and watched him from above. When I told Bill about this big fellow, he was sure it must be old Baldy himself.

Eagles have their pet hunting spots and linger in one neighborhood for years. I followed this one for quite a little distance, and noted his eyrie from an eleven thousand foot altitude.

In following him, I could see he had a wonderful short turning radius which my ship could not match. Apparently, too—as the books said—he was unable to see me flying above him.

He didn't pay any further attention to my ship. This is because his eyes are equipped with double lids, one from side to side, like a camera lens and one on the outside which goes up and down.

Bill Bliss made arrangements with his father. The rancher was to go out on horseback the day we planned to hunt and scare up some of the eagles known to him. We made a similar arrangement with most of the others in that district. They were so bothered by these vicious killers they were glad to co-operate. So, besides old "Baldy," we had about fifteen other birds located for hunting.

Fifty miles south of Marfa is the Mexican border. Between is a desert of badlands and wild canons where nothing can live or travel. All through the Davis Mountains, to the south and west, the country is wild and sparsely inhabited.

The mountains are very high, with great precipitous box canons and needle pointed rocks. Altogether, it was a most uncomfortable country for a possible crack-up. I suppose, that I really was as excited about it all as Bill was—in spite of my better judgment.

Taking off, the next day, I headed for the same territory where I had met the big fellow. Whether it was old Baldy or not, we determined to get him first.

I had Bill roped in the front cockpit and he was having a terrible time with his gun. The force of the one hundred and fifty mile prop blast past the front cockpit made it difficult for him to keep his gun in position to shoot.

I'd given him what details I knew about shooting against wind currents, angles of momentum and so on. It was an exceedingly cold day in February and he crouched down, half exposed to the cold wind. He must have been frozen stiff before we were over the hills, but he never said a word. It was his party.

The air was rougher than the dickens above the canon where we found my eagle of the day before circling below us. I poked Bill and he nodded his head violently. This must be old Baldy. I got into position and then dived over on one side. When we were within about fifty feet I kicked the right rudder and skidded the ship so Bill could shoot without hitting the prop. Our first try was a miss.

I circled for altitude again, lined up and slipped the ship down on him, a bit more carefully this time. Better luck, but he dropped about fifty feet, straightened out and started to glide on a current across the canon.

I turned after him, pell-mell, with guy wires whistling and the whole ship trembling. He was hurt, but not seriously, so I circled again for position. We were only about five hundred feet from the ground and it took me several minutes to get altitude enough to look for him. No sign of old Baldy. Somehow he had flown away and although we hunted for an hour we found no sign of him.

We had failed in our first attempt and we were terribly disappointed. Unless old Baldy crawled into a hole somewhere and died later, he would be more of a bandit than ever, killing now for mere revenge.

Eagles have wonderful vitality and live for many years, even if they are crippled. If he recovered, we'd know it! Sorely dejected, I turned the plane and we followed our original course to another nest close to the Bliss rancho.

The mountains here are around ten thousand feet above sea level and the air is very cold and thin. Cold makes a pilot's brain slow up and his mechanical response is also sluggish. The combination makes high altitude flying more difficult and four or five hours is about all I can fly, safely. We'd been up a little over an hour and no eagles!

Slightly below us and off to the right, after about fifteen minutes of circling, we saw a grassy plateau and about a score of sheep grazing. Just below us, slowly circling over his intended victims, was a large Mexican eagle.

I circled until we were down wind. A head-wind slows a plane in relation to the ground. When we were well above the eagle, I dove down with the motor idling, so as not to frighten the bird. I then skidded the plane and we shot, but the eagle set his wings and

(*Concluded on page 366*)

Flight Course for Girls at Lake Erie College

COMMUTING to school by plane is the latest fad at Lake Erie College for women, Painesville, Ohio, where thirty girl students are taking up flying as a part of their regular school curriculum.

The Lake Erie girls flying club is the second girls' college flying club in the country—the first being at Smith College, Northampton, Massachusetts. Regular college credits are given for the course.

The girls fly at an airport close by the school grounds. Recently one of them flew 60 miles away to her home at the opening of the Christmas vacation and back to school again when vacation was over. Several have soloed since the beginning of the course.

The club has recently joined the National Intercollegiate Flying Association to which college flying clubs from all over the country belong.

"Teacher" of the course is Pilot Dewey Eldred.

Here are the girls lined up at Lake Erie College in front of the school plane. This group is now a member of the National Intercollegiate Flying Association, built up of college flying clubs all over the United States.

High-Lights and Side-Lights

by M. A. RODDY

Pertinent notes upon the progress of aviation and brief notes on the aviation personnel. Read the snappy paragraphs dealing with the doings of the month.

COLONEL EDGAR S. GORRELL, the new "czar" of the airlines, appeared before the Copeland SAFETY committee and complained about the unfairness of the airmail law which prohibits airline executives from drawing more than $17,500 annually. This is all very nice and good, but I thought that it was the purpose of the committee to increase public safety in air-travel and not salaries.

The committee has asked for $25,000 more to continue its investigation, which has already produced some blistering testimony hitting Eugene Vidal and the Air Bureau of Commerce. C. H. Dolan, former aviation expert for the Post Office and now a Senate investigator, declared that aviation lines are "permitted to get away with murder" and that the air bureau was "gambling with human life by playing politics," replacing competent employes with political appointees, some of whom had never been aloft and have only a faint knowledge of regulations designed to protect pilots and the public.

Senate Investigator Charles Harry Payne told the committee that, while calling for weather data near Charlottesville, Va., he found the observer away and his wife at the post giving out weather information to the effect that she reckoned "from where I'm sitting it's cloudy."

* * *

AWAY back last year I told you in this column that there was plenty of heat on the Air Bureau and believe me, if it gets any hotter and it will, Mr. Vidal will be wearing an asbestos suit.

Although the contents have not been made public as yet, the report of the special investigation of airmail contracts made by the Department of Justice, following Farley's cancellation order, will exonerate the aviation companies of both civil and criminal liability.

* * *

ARRANGEMENTS have been concluded between the United States and Great Britain for experimental trans-Atlantic air service to begin in all probability this summer while discussions are in progress in regard to French service.

Returning to his native land, Baron Amaury de la Grange, French Senator, accompanied by Jean Schneider, secretary general of Air France, indicated that his air survey of the United States was productive and he hoped that France would establish regular ocean mail schedules in 1937, but he did not believe that passenger service could be expected before 1939, as it was necessary to develop an engine capable of 1,500 horsepower.

"Passenger ships," he also said, "would have to weigh about sixty or seventy tons for comfort and efficiency."

* * *

THERE are thirty-five airplane factories in Great Britain, fourteen of which are building nothing but military planes. France has thirty-two aircraft plants on government subsidies. Germany has seventeen, one of which employs 15,000 men. Russia can produce 2,000 planes yearly with eleven factories, while Italy is able to build 100 fighting planes per month. Japan has seven plants manufacturing military planes. U. S. factories produced only 459 military airplanes last year.

Here is Colonel Roscoe Turner and his new gas-scooter with which he makes tours into town from the outlying airports. Looks like a handy contrivance but we'd hate to have that front wheel stick in a deep rut.

* * *

CELEBRATING the fifteenth anniversary of scheduled night flying over established air routes, United Air Lines staged a commemorative coast to coast flight in which Pilots Jack Knight and Frank Yager, first night airmail flyers, took part.

Since the pioneer night flight, over 30,000,000 night miles have been flown by United Air Lines over the same mid-continent route. Prior to the inauguration of night flying, the mail was carried by plane during the day and transferred to trains at night.

On February 21, 1921, a flight was started from San Francisco with my friend Jack Knight flying the night trick between North Platte, Neb., and Chicago, aided by farmers lighting bonfires along the way.

The mail reached New York in thirty-three hours and twenty minutes, more than twice the time required now for crossing the continent with passengers and mail.

* * *

HARRY S. GUGGENHEIM, son of the founder of the Daniel Guggenheim Foundation for the Advancement of Aeronautics, envisions an aviation industry comparable to the automobile industry through the development of an economical, safe, small plane.

* * *

DURING 1935, domestic airlines flew a total of 55,380,353 miles compared with 42,675,315 miles in 1934, while passenger mileage totaled 313,380,353 against 187,853,629 in 1934. Airmail carried in 1935 set a new high in volume with 13,276,023 pounds which doubled the poundage of the preceding year.

Col. Edgar Gorrell predicts that more than 200,000 persons will use air transportation for the first time during 1936.

* * *

TRANSCONTINENTAL and Western Air has formed an independent air express system to compete with that recently formed by the Railway Express Agency and a group of airlines, which means that there will be quite a battle among the companies for supremacy in the air express field. . . Oh, Colonel Gorrell!

* * *

A LONDON school of flying has added to its curriculum the study of the psychology of cows since they always stand with their tails to the wind and knowledge of this fact has saved the lives of airmen when making forced landings.

* * *

DOCTOR GEORGE W. LEWIS, director of research of the National Advisory Committee of Aeronautics, states that the design of airplanes will have to be changed if speeds over 575 miles an hour are to be attained as this was proved by the effect of wind studied in the "super speed" wind tunnels at the Langley Field, Va., laboratories.

* * *

DE PAUW university students have formed a flying club and have elected Robert Oxnam, son of Dr. G. Bromley Oxnam, president of DePauw, head of the new club. . . A number of coeds are included in the membership. They will receive instruction from experienced aviators from Indianapolis and Terre Haute, Ind.

* * *

JIMMY MATTERN will have an opportunity this summer to play host to Sigmund Levaneffsky, Russian aviator who flew to Jimmy's aid when he was forced down in Siberia during his attempted world flight in 1933. Following a proposed nonstop flight from Mos-

XUM

cow to San Francisco, Levaneffsky plans to visit Chicago on a goodwill flight. Bennett Griffin, former flying partner of Jimmy, is now engaged in laying out an instrument-approach system for the Chicago municipal airport, as developed for the Army Air Corps by Major Albert F. Hegenberger.

* * *

THE House Military Affairs Committee has approved the McSwain bill, authorizing construction of 4,000 new airplanes in the next five years, although under existing law authorization is provided for a maximum of only 1,500 planes and the War Department appropriation bill, which has passed the House and is pending in the Senate, provides for buying 565 planes in the next fiscal year. Although the Baker committee recommended a strength of 980 planes, the first anniversary of the GHQ air forces of the Army Air Corps found only 174 suitably technical airplanes.

* * *

AVAILABLE statistics for January first show Britain with 3,600 combat planes; France, 3,400; Russia, 3,300; Italy, 2,800; U. S. Army and Navy combined, 1,900; Japan, 1,800; and Germany, 1,600.

* * *

AN Illinois chapter of the "99-ers" has been formed in the Chicago area and Jane Ray, who is also an inspector for the Illinois Aeronautics Commission, has been elected chairman of the Illinois chapter with Helen Colton, secretary-treasurer. . . Other members are: Helen Budwash, Eleanor Domack, Gertrude Chester, wife of Art Chester, Loretta Breen, Violet Crosbie, Dorothy Ring, Katherine Lindeman, Doris Langher, Emma Sprague, Jane Meyer, and Mabel Wilson, who not only flies but is the only woman operator of an airport.

* * *

ANNOUNCEMENT has been made by the National Aeronautic Association that Helen Richey won a $100 cash prize offered for the first American flier to establish an international record after February 1, when she took off in an Aeronca "flivver" from Langley Field, Va., and averaged 72.224 miles an hour over an official 100-kilometer course.

* * *

DUTCH authorities are reported to have arrested Alfred Harred, the reporter who sent an alleged false report concerning the rescue of Paul Redfern, American flier lost in the jungles in 1927 on a projected South American flight.

* * *

WHILE standing in the Union Station in Kansas City, Rear Admiral Byrd wearing his naval cap and a long blue overcoat, was mistaken by a woman for a conductor when she asked the polar explorer to take charge of a pocketbook she had found.

* * *

EVEN though pilots are able to fly blind, airline officials insist that nudists don't nude while in flight which

(*Concluded on page* 385)

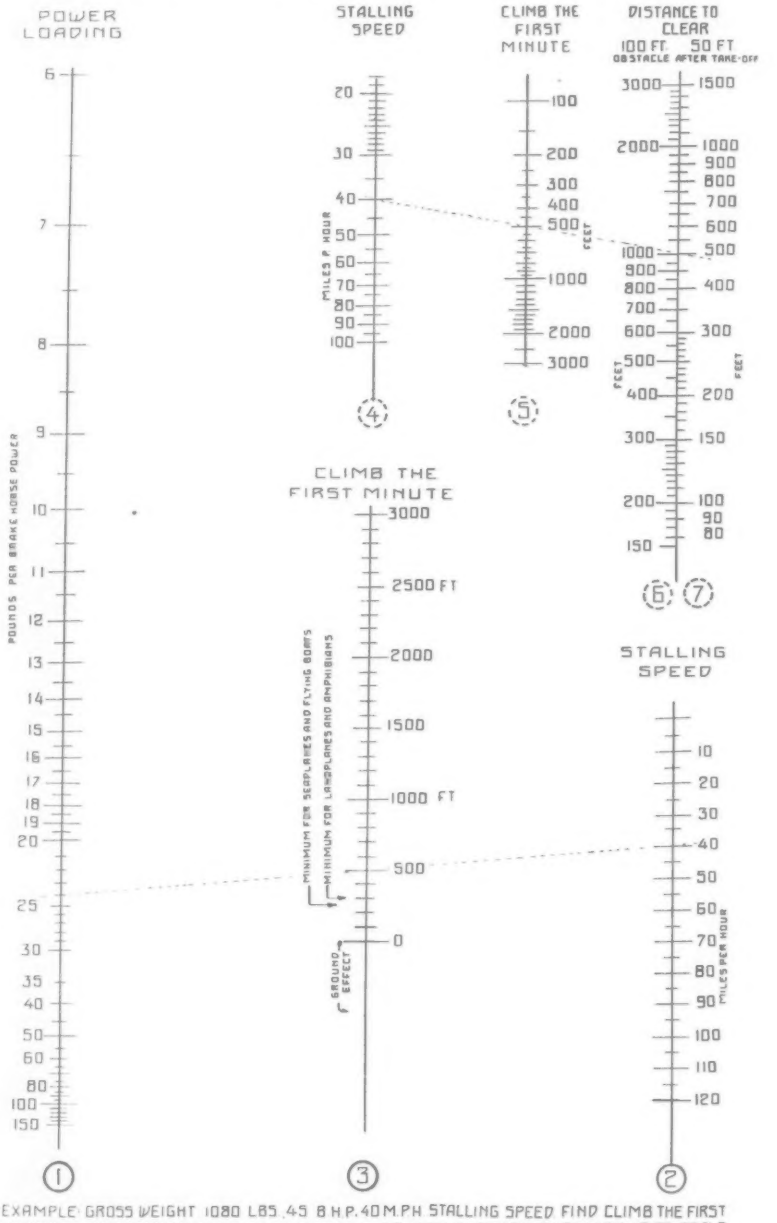
Calculating Speed at Ground Level

by RAOUL J. HOFFMAN

OUR nomograph for this month covers the factors governing climb and take-off. First, it determines the rate of climb in the first minute and the horizontal distance required for clearing an obstacle 50 or 100 feet high. It is hardly necessary to say that these performance predictions are of the greatest importance.

Experiments reveal the fact that, up to a few chord lengths, the proximity of the ground reduces the stalling-speed and assists the rate of climb. This is probably due to the effect commonly called "ground compression," due to the interaction of the ground upon the downwardly projected air-stream from the wings.

This effect is also dependent upon the aspect ratio of the wings and the elevation of the propeller axis in respect to the wing.



EXAMPLE: GROSS WEIGHT 1080 LBS. 45 B.H.P. 40 M.P.H. STALLING SPEED. FIND CLIMB THE FIRST MINUTE AND DISTANCE TO CLEAR 50 FT. OBSTACLE. CONNECT 24 ON SCALE Nº 1 WITH 40 ON SCALE Nº 2. THEN YOU WILL FIND LINE INTERSECTING SCALE Nº 3 AT 500 FEET, CLIMB THE FIRST MINUTE. CONNECT 40 ON SCALE Nº 4 WITH 500 ON SCALE Nº 5 YOU WILL FIND LINE INTERSECTING SCALE Nº 7 AT 500 FT. WHICH IS THE DISTANCE REQUIRED TO CLEAR THE OBSTACLE.

Testing the Airline Pilots

by H. LATANE LEWIS II.

To qualify as an airline pilot calls for a strict flying test in all the branches of aviation including navigation, stunt-flying, meteorology and all the rest of it. To hold a special scheduled transport rating is the ambition of every student of aviation.

PILOTS who carry passengers across state lines in scheduled service must have more than just a transport license. In addition, they must qualify for a Scheduled Air Transport Rating, which is the highest testimony that can be given a flyer's technical knowledge and skill—a sort of Ph.D. of the air.

If you have had 1,200 hours of solo time within the past 8 years, 500 hours of which have been cross-country and 75 hours of which have been at night, then you are qualified to apply for such a rating. Let's see just what the Department of Commerce inspector will require you to do.

First, he will give you a cross-examination like a prosecuting attorney on the use of radio. Then he will test your knowledge of meteorology and, take it from me, you've got to be a veritable weather prophet to get by. When the inspector is satisfied that you'll know a thunderhead when you meet one and what to do about it, he will take you out on the line for your test in blind-flying.

You take your place in the cockpit, a hood is pulled down over your head and clamped around the cowling. You feel like a cat in a bag. It is pitch dark without a crack of light anywhere. Only the glow of the luminous instruments is visible.

The inspector takes the seat up front and handles the controls until the plane is 1,000 feet in the air. Then you hear his voice coming through the earphones in the Gosport helmet telling you to take control of the ship. You grasp the controls gingerly. We'll hope that you have had plenty of experience in blind flying, otherwise you will soon be spinning earthward and your examination will terminate with a thorough bawling out from the inspector.

"Perform a 1,000 foot spiral to the left," comes the voice through the Gosport. You put the stick over to the left and give a little left rudder, carefully watching the altimeter needle. "You are slipping a little," says the inspector tersely. You don't give quite so much aileron and the ship holds her course properly.

"A 1,000 foot spiral to the right," is the next command. And the instructor informs you firmly that this spiral must be performed with the same accuracy and precision as if you were staring old mother earth right in the face. No slipping and skidding about the sky will be permitted, even though you are as blind as a bat.

When you have finished the spirals you are told to level off and fly a given compass heading. "Maintain a course of 90 degrees magnetic azimuth," says the inspector. That isn't so hard. You simply swing the nose of the ship around until 90 appears in the center of the compass dial and continue on this course.

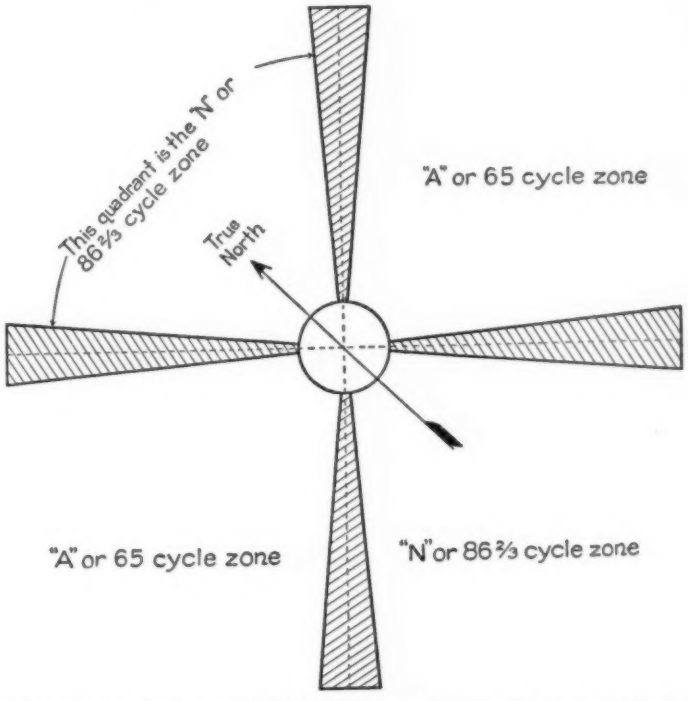


FIG. 1. The location of the range signals. The true north line from the transmitting station passes through the "N" quadrant. The shaded portions represent the beam or equi-signal zone.

Now and then a side gust will throw you off course slightly and you will have to ease back again. And "ease" is the word unless you have a gyroscopic compass. The common magnetic variety to be found in most ships performs a shimmy that would put a hula dancer to shame every time the ship's nose is moved. You just have to be patient and wait for it to stop spinning and register the true course.

Next the inspector will probably go effeminate on you and call for hairpin turns. First right, then left.

These hairpin, or 180-degree turns, are made by careful timing, using the turn-indicator and the second-hand of the clock. When the hand of the turn indicator moves away from center by a distance equal to its own width, the airplane is turning at the rate of one complete circle in 2 minutes. By holding the plane this altitude for 1-minute a half-circle, or a 180-degree turn is made. A 90-degree turn will consume 30 seconds; a 45 degree turn, 15 seconds; etc.

If you get through this test, you are doing well. The inspector, mind you, is sitting up front checking on every farm house and highway down below and can tell just how accurate you would be if you got fogged in with a load of passengers and wanted to turn back and high-tail for that emergency field.

Next, you are ordered to simulate the maneuver of pulling up through fog. One of these days you might want to "go over the top," as climbing up above a cloud bank is called. So you watch your rate of climb indicator and push your ship up until the inspector decides that you are no longer fog bound. Then, changing his mind as often as the woman in the proverb, he has you go right back down and mush through the mist as if feeling for the ground.

You don't "feel" below 500 feet, however, for Department of Commerce regulations prohibit a transport from flying into an airport with a ceiling of less than 500 feet. Some pilots have been found to overdo the "feeling" process and have come into unpremeditated and violent contact with terra firma.

"Now perform crossed-control turns of 720 degrees" says the inspector heartlessly. This means that you are to whirl around in two complete circles with your wings vertical. And if you think that it's easy to do without falling off on a

wing and spinning, just try it blindfolded at 1,000 feet some time.

In these crossed-control turns, the elevators are so nearly vertical that they are used to swing the ship around instead of the rudder. Likewise, the rudder becomes the elevators. Making the change from one to the other is the big job.

If you get through all this and still have your sanity, the inspector will take control of the ship and give her the works. He will kick it about the sky in every possible position until you think he is going to turn it inside out. Then, just when he has you in some outlandish position and you are wondering whether or not you are going to part company with your last meal, he will shout with fiendish glee, "Now you take control and bring her out on compass heading 135 degrees."

Well, you may be hanging in a partial wing-over and you are lucky if you even know which way is down. But if you are a good instrument flyer you will soon be able to center the dancing needles on the dials and laugh at the inspector.

But he is not yet through with you. The voice, which you have begun to thoroughly dislike, comes through the speaking tube once more. "Tune in on the radio range beacon; find one of the four course; identify it; and follow it to the transmitting station" you are told. That is the biggest order of the day and you settle down to some real work.

It should be explained here parenthetically that a radio range beacon transmits continuous signals in a space pattern divided into four sectors, two "N" sectors and two "A" sectors. The letters are transmitted in Morse code, "dash-dot" and "dot-dash", respectively. The equi-signal zone, or long dash zone, is produced by the overlapping of the sectors, and consequently is the dividing line between them. The "N" sectors are opposite and the "A" sectors are opposite. The "N" sector is the sector through which the true north line from the station passes. See figure 1.

When a pilot tunes in and picks up one of these letters, he does not of course know just which sector he is in, nor whether he is flying toward the station or away from it. Therefore, a definite system of orientation must be followed to find the station. Several methods are in use, but the most popular one is that involving the 270 degree turn.

When you tune in, your headphones are chirping away, "dot-dash dot-dash dot-dash". Now you know that you are in one of the "A" sectors. You pull out your chart of the beacon and find on it the angle of the "A" sectors and the compass course bisecting this angle. (See figure 2.) You determine what the course perpendicular to this line would be, which you find for the "A" sectors is a compass course of 40 degrees.

Everything is fine so far. You just sit tight and follow your 40 degree course until the "dot-dash" suddenly stops and you pick up a long, continuous hum. That is the equi-signal zone, or beam. From now on you have a set rule to follow under all conditions. There are two turns of given angles to make. The first is a 90 degree turn to the right for the purpose of identifying the beam.

If, upon turning to the right, the "A" signal is again picked up, you know that you are in the east sector, for had you

(Concluded on page 381)

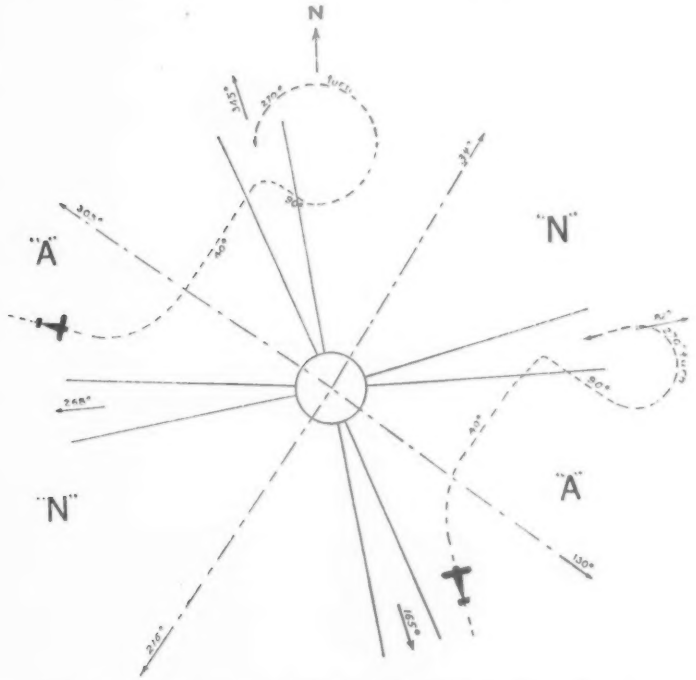


FIG. 2. Diagram of the 270-degree turn method of radio range orientation, showing orientation from the "A" quadrants.

Aeronca Holds Model Contest

ALL of our model builders will be greatly interested in the great model contest being sponsored by the Aeronautical Corporation of America, builders of the famous Aeronca lightplanes. In view of the fine prizes being offered, this should easily prove the most important and greatest model contest yet held in this country.

The Aeronca National Model Airplane Craftsmanship Contest is divided into two divisions, this being made necessary by the nature of the first prize. The Senior Division includes all contestants 16 years of age and over, while the Junior Division is open to boys under 16 years of age.

Outstanding above all similar first prizes yet offered is the free amateur pilot's flying course in the Senior Division. This course includes 36 hours of flying in the new Aeronca low-wing cabin plane plus six weeks' free room and board while receiving flying instructions in Cincinnati. This is truly the answer to the model builder's prayer—the goal toward which all model fans aspire.

But this is not the sole reason for building a model of the 1936 low-wing Aeronca. There are ten valuable prizes in each of the divisions to be paid in cash. The first prize in the Junior Division is a $100 cash award, with a second prize in the Senior Division of the same amount. And then follow, in a descending scale, the cash awards for the remaining prizes.

Do not delay in making your entry. You will need all the time at your command to build the best model that you know how to build and cash in on these outstanding awards.

A Bear Yarn

FRANK T. BELL, commissioner of the Bureau of Fisheries in Alaska, brought back a bear story when he visited Washington. While making an airplane flight over the Arctic, Mr. Bell said, he sighted a group of twelve bears. As his plane neared them, the beasts stood on their hind legs, pawing vigorously at the air. He descended to 200 feet and the bears rolled over on their backs, clawing even more furiously in the direction of the supposed enemy. They were still at it when Mr. Bell flew away.

Electric Gas Control

THE use of electricity in the airplane is gaining. Now it is expected electricity soon will be guarding gasoline-lines, oil-lines and pipe-lines on planes, according to L. G. Riley, Westinghouse engineer, who has developed a new electric fuel valve.

A powerful magnet acts upon a small steel plunger to open or close the valve. The device should still further reduce the hazard of fire in planes because the valve will automatically close, making a leakproof seal in the gas lines, when the pilot turns off the plane's ignition.

Development of the Transports

by ROBERT H. RANKIN

The rapid development of the commercial airline transport plane is a mighty interesting story which has been well handled by the author. The engineering genius expended in the design of commercial craft stands unequalled by any other branch of engineering.

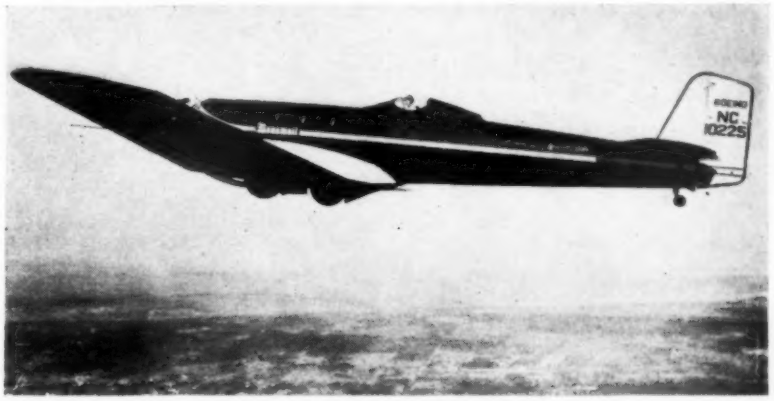
IT has been more than thirty years since the Wrights gave the first practical airplane to the world. Since that time, more than 37,000 planes and at least 53,000 airplane engines have been produced.

No art, science or industry has progressed as rapidly as the aviation industry. Commerce, the pulse of our modern civilization, has demanded speed and aviation is the sole answer to that demand.

The story of aviation's progress is mirrored to a very great extent by the development of commercial air transportation. Of course, the World War was responsible for the first great expansion in aviation but, with the end of that conflict, there was a sharp recession brought about. This recession or "slump" was checked by a few manufacturers and operators who, with a faith in the possibilities of the airplane as a factor of transportation, began the development of what is today commercial aviation.

Up until the year 1926 there was little or no development in the field of commercial aviation and most of the planes flying on the then existing commercial routes were powered with war surplus engines. Little attention was paid to the comfort and convenience of the air traveler and every time a person wished to make a trip by air he had to sqeeze himself into a cumbersome flying suit, perhaps buckle on a parachute and, then wait until the plane's engine was started and warmed up.

The majority of the flying fields were in poor condition and almost any level cow pasture was dignified with the name of airport. In short, commercial aviation in 1926 was, for the most part, an experiment. In this year there were some 19 commercial operators, the most of them being small, private enterprises.



And here is the Boeing Monomail, the outstanding sensation of 1931. This is the forerunner of the present Boeing 247-D employed on the United Air Lines and elsewhere. The Monomail was the first successful smoothskin ever built.

In 1927, there was a general expansion of the aviation industry, and commercial aviation began to slowly emerge from the experimental stage. Regularly scheduled routes became a reality and airline operators began to feel the need of improved flying equipment. By the end of the year there were some 15,128 miles of airways in this country, two-thirds of which were equipped for night flying. Late in the year, feeder lines were being developed to connect with the main routes.

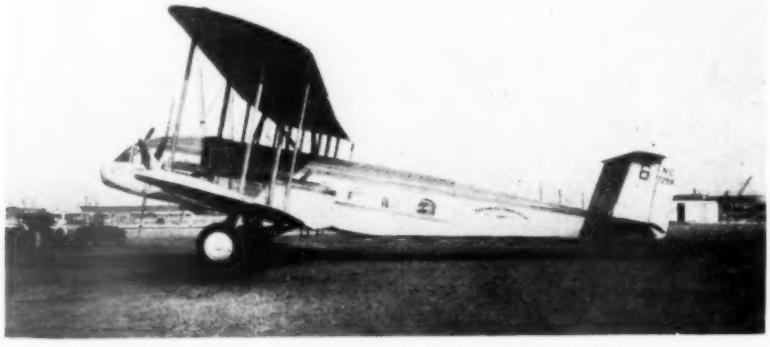
In spite of this expansion, it was not until the following year that any forward step was made in the design of planes for commercial use. Early in 1928, the first step was made when Boeing introduced its model 40-B4 on the Chicago-San Francisco division of the Boeing Air Transport Route. This ship, a development of the earlier model 40, was a biplane type. Welded steel tubing was used in the fuselage construction, while the wings were built up with spruce spars and ribs, the entire structure being fabric covered. The plane was fitted with a cross-axle type landing gear. It had accommodations for four passengers, and powered with a 525 h.p. Pratt & Whitney Hornet it showed a top speed of 135 m.p.h.

During the year 1929, the safety and comfort of the passenger was given serious consideration for perhaps the first time. Chairs were studied and changed to the end that the air traveler might ride with more ease. The artist was consulted with the result that cabin interiors became the last word in interior decoration.

The science of the radio engineer and the weather bureau expert were brought into play to make safe flying a regular factor on the various systems. Standard equipment on the larger planes included reclining seats, lavatories with provisions for hot and cold water, forced ventilation and heating, insulated and sound-proofed cabins, large windows fitted with non-shatterable glass, and dome and ceiling lights.

During this time the Keystone Patrician was placed in service, this craft was the largest built during the year. It carried 18 passengers in addition to two pilots and had a wing spread of 90 feet. Weighing 15,000 pounds fully loaded, the plane was powered with three motors and had a flying range of some six hours.

Then, Tony Fokker offered the F-10, a fourteen passenger, tri-motor job and the F-32, a thirty-two passenger ship, powered with four P & W Hornets mounted in tandem. This craft took the place of the Keystone Patrician as the largest plane in this country. In addition



The original Curtiss Condor transport plane, the forerunner of the Curtiss Condors now employed by the American Air Lines and Eastern Air Lines.

XUM

to these two planes, Fokker was also producing his smaller, single engined Universal and Super-Universal jobs. These craft employed the usual Fokker construction with laminated plywood wings and fuselage built up of fabric covered welded steel tubing. Glenn Curtiss at this time brought out the twenty place Condor powered with two geared Curtiss Conqueror engines. This ship was the forerunner of the Curtiss "flying Pullmans" used by the American Airways. The Boeing concern now placed their fourteen passenger model 80-A on their airways, while in the field of the smaller transport, Guiseppe Bellanca was producing an efficient cabin monoplane job.

It should be mentioned here that no attempt is made by the author to list all the different makes and types of transports built. Such mention would fill a good sized volume. Only the most outstanding makes and models are mentioned in this article.

During this same year, the New York, Rio, and Buenos Aires Air Line inaugurated a passenger service between the Americas using twenty place Consolidated Commodore flying boats, and Pan American extended their service, using Sikorsky S-38's.

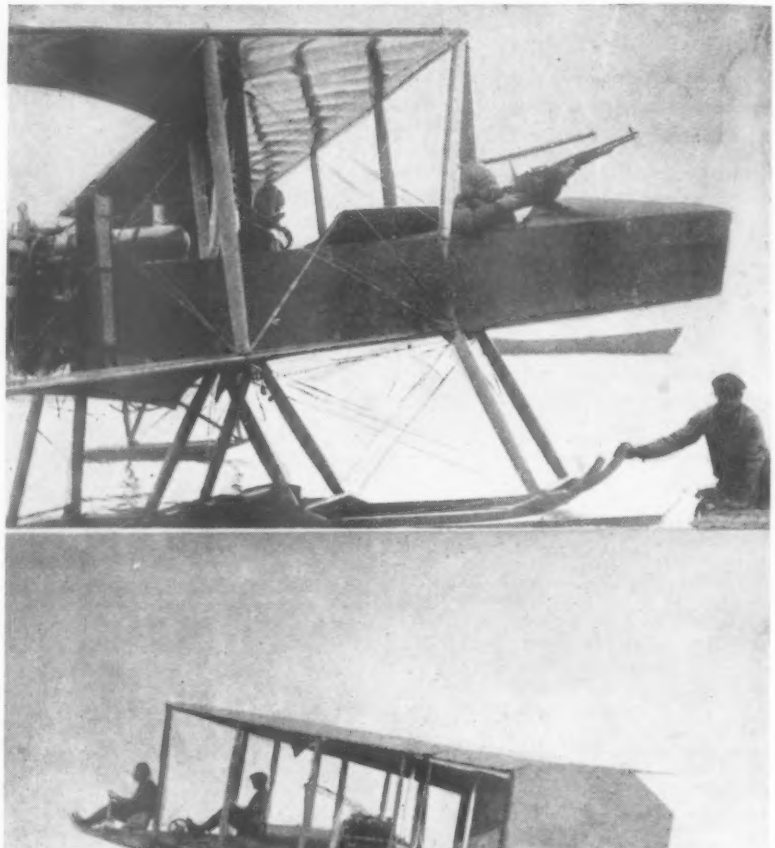
The S-38 was one of the first practical amphibians developed and it was the first of the now famous Sikorsky line of amphibians. Fitted with two 400 h.p. Pratt & Whitney Wasps, the craft carried twelve passengers at a high speed of some 125 m.p.h. With the S-38 as the nucleus of their equipment, Pan American started their service between North, South, and Central America.

The year 1930 saw an extension of air service over the entire United States and the various countries in South America. Few new types of transports were brought out during this period, but many changes were made in various ways to the designs employed in the existing models with the result that in general, transport design showed a marked improvement. Special mention must be made of the Ford all-metal planes at this time. These ships which were built in a series of different models of both single engine and tri-motor types, were put into service on many of the nation's leading air ways. So well were these "tin geese" designed and built that it is only recently that they have given way to modern ships.

In 1931 probably the most outstanding ship built was the Boeing Monomail. This craft carried five passengers and more than 500 pounds of cargo. It was powered with a Pratt & Whitney Hornet and it made a top speed of around 140 m.p.h. and it is historically important as being the first successful smooth metal skin commercial plane ever built. It was also the first commercial job to be fitted with a retractable landing gear and it was the forerunner of the Boeing 247-D transport and the Boeing 299 giant bomber. This year also saw the improvement of the various models offered by Fokker, Bellanca, Ford, Curtiss, and Sikorsky.

(*Concluded on page 379*)

The Burgess-Dunne Auto-Stable Plane



ABOVE. The Burgess-Dunne seaplane with a 120 h.p. Salmson engine delivered to the U. S. Army in 1915. The standard landing gear is attached to the top of the hull. BELOW. A Burgess-Dunne taking off. Note the position of the pilot on the extreme front wing apex.

ONCE upon a time, inventors and designers made really serious attempts at producing safe stable planes—believe it or not. Instead of seeing how many h.p. they could tuck away in the nose of the plane, they devoted a lot of time to the problems of stability and safety.

Prominent among the early self-stable planes was the English Dunne Arrow, later to be known in this country as the Burgess-Dunne Arrowhead. This plane was of the "inherently stable" type with its surfaces so arranged that full compensation for rolling, diving and yawing was built into the ship without the assistance of any automatic dooflickers or delicate instruments.

In the first place, there was a tremendous amount of sweepback so that the planform was that of an arrow with an apex angle of about 90-degrees. This gave the required fore-and-aft stability. The angle of incidence decreased to zero at about the center of the wing, becoming strongly negative at the tips somewhat after the zanonia leaf style. Tremendous vertical curtains at the rear compensated for yaw so that the whole affair was highly stable against any ordinary atmospheric disturbances.

But, as so frequently happened, the ship proved too stable for comfort. It was stable to the point of "bullheadedness" so that it strongly resisted and resented any effort of the pilot to guide it. In short, it was so "stiff" on the controls that it fought the pilot.

Loss of maneuverability and speed are two of the most serious charges that we can bring against the inherently stable plane as we now know it, but these are secondary faults that are subsidiary to stability and safety in flight, at least as far as privately owned planes are concerned.

Two New Aeronca Lightplanes

by BERT D. LYNN

One of the new Aeronca series planes is a radical departure from previous Aeronca practice, while the other new ship for 1936 is a greatly refined Aeronca Collegian. The cabin job is shown in colors on the front cover.

DURING the hectic period of aviation history from 1927 to 1930, the major trend was toward a larger and more expensive airplane.

At this time, however, a senior aeronautical engineer of the U. S. Army Air Corps at Dayton, whose name was Jean A. Roché, was attempting to find a safe and yet more economical means of air travel. His experimental work finally created the original Aeronca single-seater.

After his original diagrams and details were completed, Roché spent three years in development work. At last, in 1929, a complete ship was thoroughly tested at Wright Field by Major Brower of the Air Corps. His report of praise brought to realization Roché's ideal of a plane to pioneer in sport-flying.

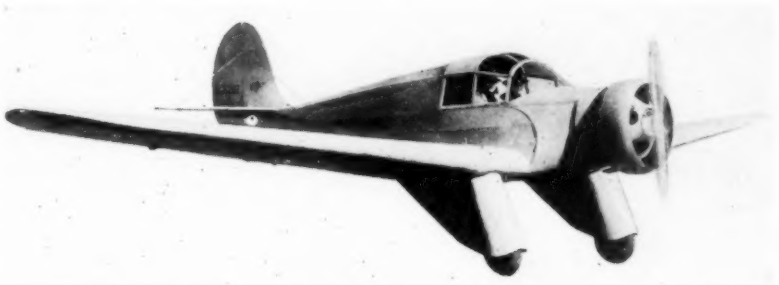
Within a few months, the Aeronautical Corporation of America was organized by Cincinnati business leaders to produce Aeronca planes. A modern factory was built at Lunken Airport, Cincinnati, and Aeronca has been steadily forging ahead, with production and sales since early 1930.

Aeronca engineers have been turning out a line of lightplanes whose safety, economy, comfort and maneuverability are attested to by many enthusiastic owners. The latest model of the original famous Aeronca design is a new Collegian with increased performance and vastly improved fairing and streamlining.

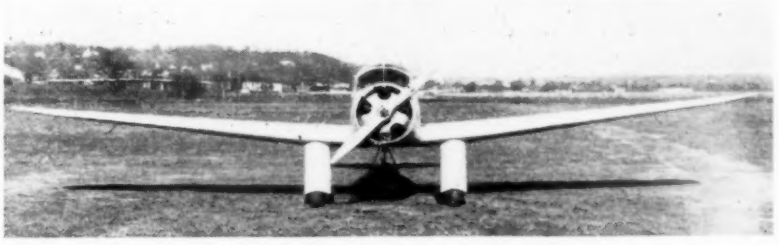
Previous Aeroncas haven't cut much of a figure so far as beauty was concerned, but the present ship has an appearance that approaches its fine performance. The Collegian may be had in open and closed models, and with Edo floats available for a neat seaplane job.

The cabin in the closed C-3 seats two and is fully upholstered, with air and weather-tight windows having no-draft ventilation. The use of the monoplane wing, large slanted windshield and wing-cut-out provide excellent downward, forward and overhead visibility. A chrome steel fuselage contributes to the plane's rugged construction. The wings are spruce with dural leading and trailing edges. It is double drag-wire braced, top and bottom.

Gliding angle of the Collegian is 10 to 1, meaning a gliding range of 10 miles from a 5,000 foot altitude. Gas and oil cost about one cent per mile. Over-all operating expense is three cents per mile. In an interesting test recently a Collegian was flown from Miami to New York, using only 40 gallons of gas and one quart of oil.



Three-quarter front view of the Model C-70 Aeronca, a radical departure in design from all previous planes of this make. The Aeronca low-wing C-70 is a fine clean-cut lightplane with an excellent performance.



The front view of the Aeronca C-70 shows an absence of external bracing or other items productive of parasitic resistance.

And here we have the new 1936 Aeronca Collegian C-3 which still retains the representative elements of the original Aeroncas which have proved so popular.

SPECIFICATIONS

Aeronca Collegian C-3

Powered With Aeronca E-113B Engine (40 H.P.)

Top Speed	93 m.p.h.
Cruising Speed	85 m.p.h.
Landing Speed	35 m.p.h.
Rate of Climb	450 ft. min.
Service Ceiling	12,000 feet
Cruising Range	200 miles
Gross Weight	1,006 lbs.
Empty Weight	569 lbs.
Useful Load	437 lbs.
Length Overall	20.0 ft.
Height Overall	7.5 ft.
Wing Span	36.0 ft.
Wing Area	142 sq. ft.
Wing Loading	7.0 lbs. per sq. ft.
Power Loading	25.0 lbs. per h.p.

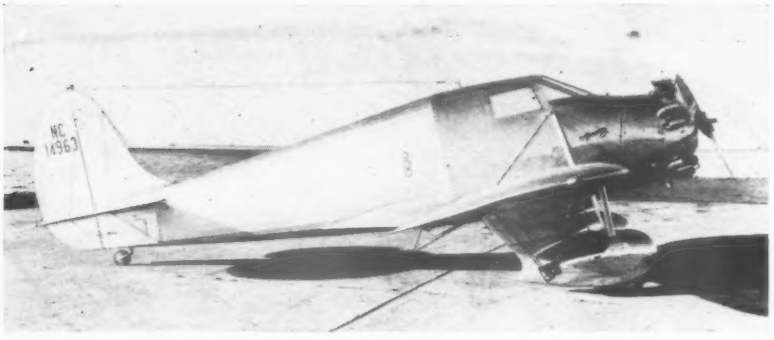
A new low-wing monoplane now going into production is a radical departure from previous Aeronca styles. Aeronca moves up into the higher-powered field with this job which retains no previous Aeronca characteristics other than low-price and high quality performance.

The C-70 model has a LeBlond 70 engine, the C-85 has a LeBlond 85 engine. Warner Scarab Jr. (90 H.P.) and Lambert R-266-A (90 H.P.) motors are also available.

A full cantilever wing, streamlined

(*Concluded on page 370*)

The Kinner 160 H.P. Playboy At Show



This is the Kinner Playboy, a two-place low-wing cabin job that has proved very popular with private owners.

AMONG the exhibits at the National Pacific Aircraft & Boat Show, Los Angeles, was the two-place cabin Playboy plane shown herewith and the two-place open type Sportwing model, both of which were powered with the Kinner Type R-5 160 h.p. Series 2, engine. A large model of the Kinner "Invader" was also displayed, a six-place ship which was shown in the April issue of POPULAR AVIATION.

The Kinner booth also displayed, for the first time, one of their new 14-cylinder double-row radial engines, a cut-away model of the 125 h.p. engine and the new supercharged C-7 engine which is used to power the Kinner Envoy. We will describe this engine in an early issue.

Doping and Varnishing Your Plane

by F. NAGLE

(*Continued from the April issue*)

THE use of ordinary varnish thinners, and especially cheap thinners, should be avoided in doping your plane. The thinner will dull the finish of a pigmented dope and weaken its resistance to weather. Again, it takes longer to cut the lacquer with a thinner and tends to make it stringy.

Therefore, get a thinner of good grade that is intended for thinning dope. It will give a better job.

Now that the first coat of dope is thoroughly dry, we are ready to apply the second coat with the tape. Put on, or dope on all patches before you run the tape. Either fray or pink the edges, not only to make a better looking job, but to prevent the edges from curling up. Run the rib tape first, and then tape the edges.

Dope between ribs, so this will count as a second coat. Let this coat dry two hours or so, and then rub over with medium sandpaper. Rub lightly and get off all the hardened fuzz and rough spots. Don't cut through the tape at the lock-stitch cords, or other hard spots under the fabric.

Now for the third coat, and how this goes on depends on whether the color is to be sprayed or brushed on. If you are going to spray on the color, give a good coat of aluminum dope, mixed on the basis of four ounces of powder to the gallon of clear, and thinned down to clear dope consistency. Sand lightly after this coat, and use aluminum for the fourth and fifth coats.

Sand lightly after the fourth coat. Don't try to brush the dope out as you would paint; a good doper just flows it on, brushing it out only enough to stop runs, and prevent streaks. Some do not use aluminum till the fourth coat, preferring clear for the third, but it makes little difference in the final finish.

If you are going to brush on your color coats, mix about a pint of the thick pigmented dope to the gallon of clear, and brush this on for the third coat; sand lightly, and use the same mixture for the fourth. Sand very lightly, but remove all rough spots after the fourth coat, and for the fifth coat use pigmented dope of the desired color, thinned down with just enough thinner or reducer to allow easy brushing. This will give you a good color job, and make a finish that will stand weathering, without showing it.

The above paragraphs tell how to get your final finish if using a brush. However, some of you may have access to a spray outfit, and desire to spray on the final color. Dope with aluminum as explained a paragraph or so back, but sand the fifth coat down smooth. Now cut the pigmented dope of your desired color, with thinner, till it is thin enough to spray properly in your gun.

After wiping off all dust from the surfaces to be sprayed, spray on a wet coat of dope. Hold the nozzle of the gun about six inches away from the surface, and get the dope on wet, but don't put it on so thick that it runs. Cross spray, and overlap each spray width about half. Two good spray coats will generally give a good color job, that will last, but three are preferable if the ship is to be left out in the weather, or the color you are using does not cover or hide well.

(*Concluded on page 370*)

Solve Propeller Icing

ONE of the major hazards of flying is believed to have been conquered according to the announcement made by Eugene L. Vidal, director of Air Commerce.

This announcement was made in regard to the ice formations on aircraft propellers, which have been fought by both the government and the aeronautic industry. A simple device, known as a "slinger ring," provides for the continuous feeding of an anti-ice solution to the propeller blades while the ship is in flight. The "slinger ring" which is 12 inches in diameter, 2 inches wide, weighs 2 pounds, is attached to the back of the propeller at the hub.

Research was started in earnest last July, when the Bureau of Air Commerce assigned one of its best engineers, I. R. Metcalf, to the problem of de-icing propellers. After extensive research and experiment he devised the "slinger ring" to serve as the device intended to greatly aid flying.

The actual construction was by the B. F. Goodrich Co., Akron, Ohio, in cooperation with the Transcontinental & Western Air Co., Inc., who furnished two three-blade propellers, two engines, a test-stand, and 10 hours of flying under actual ice conditions. The B. F. Goodrich Co. operates a refrigerated wind tunnel in which ice conditions, such as experienced in actual flight, were reproduced. The TWA has placed an order already for sixty of the "slinger rings," two for each of their thirty twin-engined passenger airliners.

The device works in a simple way. From the ring, three tubes extend down the propeller along the leading edges of the blades and from these tubes the anti-ice solution is fed to the bare metal by the pilot who can control the flow of the mixture from the cockpit.

In the refrigerated wind-tunnel, ordinary alcohol was employed both to break up ice that had formed and to prevent the formation of additional ice. The device is so constructed as to provide for the continuous application of alcohol or any other de-icing solution to the blades for five hours of continuous flying, if necessary. Otherwise, the de-icing solution may be released by the pilot only for periods sufficient to break up the ice as it begins to form on the blades.

It was stated by Mr. Vidal that the device is available to the owners and operators of all United States aircraft, as a contribution to the safety of all who fly.

The only problem left is the need of adapting it to various kinds of propellers, but Air Commerce officials were sure that this would prove no difficulty.

It would be interesting to know just how much this operation will cost and as to the advisability of liquids other than alcohol. It would seem that a more viscous liquid than alcohol, more in the nature of glycerine, would prove more satisfactory than a thin liquid.

XUM

Al Williams—Man of Action

by M. V. BOTHWELL

A biographical sketch of the dynamic and energetic ace flyer, business man, ex-ballplayer, ex-gob and present marine. He is the distinct and outstanding personality in aviation.

AL WILLIAMS is forceful, determined, self-reliant, versatile and cyclonically energetic.

Nature gave him a robust physical constitution, plus a vigorous and ingenious brain. He is happiest when busiest. He is never satisfied with his achievements, and insists earnestly that what "little" he has done, and he stresses "*little*," makes it imperative that he do something more worthwhile. He is a stranger to deceit and conceit.

The U. S. Navy knew—for more reasons than one—that he was part of it. He glories in cutting red tape and in blazing new trails. He gave the Navy three speed records within one month in the year 1923, and one of them was not broken in the U. S. A. for eight years.

He was awarded the Distinguished Flying Cross by the U. S. Navy with a citation that attested his vast influence on aviation and his unusual courage. Excepts from one citation are:

> *Lieutenant Williams has many times undergone risk of his life, above and beyond the call of duty, for the benefit of both the personnel and the material of the service. . . . He flew in one plane out of control to complete destruction in his determination to elicit information of value to the service on the vital subject of flat spinning of service air craft. The standard combat type of plane reflects many of the improvements pioneered in racing by Lieutenant Williams.*

After checking out of the Navy, he became a reserve officer in the U. S. Marines, and is now a major in the "devil dogs" outfit. His love of the sea wouldn't permit him to be a land-lubber, and his devotion to the sky makes him foresake terra-firma and the sea for the air above.

Strangely enough, Al Williams was a pitcher for two years with the New York Giants, when the late John McGraw was pilot of that outfit. He learned then that the cheers given to a man when victory is his, turn to jeers when he suffers a defeat. The experience added to his inherent proper sense of values.

Later, he espoused law, but its pace was too slow for him. He has a license to practice law in New York State, but if he were to hang out a shingle "Alford J. Williams, Attorney-at-Law," it would probably be appended to the side of his plane, the "Gulfhawk," and his clients would have to hie themselves to an airport or take to the air for a consultation with him.

He is passionately fond of music. A favored composition is "The Old Refrain." The *New York Sunday News*, in

Al Williams, the hero of this tale, in front of the "Gulfwing."

an article within the past year, apprised the public that Al Williams plays the piano and does a very decent job of it. When he and Lieutenant Brow were preparing for their famous air duel for America's speed laurels, he spent most of his spare time in strumming on a piano.

He wanted speed records to prove to himself—and to those who believed in him and in aircraft—that he and his plane could do what was expected of them. He little dreamed, when he was putting his plane through its paces for the speed records that he set, that he would, years later, be engaged in the business of selling aviation gasoline and oils.

Major "Al" now heads the Aviation Sales Department of a well known oil company. He intends to have a higher batting average than his closest competitor, and is well on his way to getting it. His idea of business is sound. He believes that getting a contract is "just the beginning of things" and that, from that moment forward, every effort should be bent towards giving the customer the finest service and the best products that he has ever had.

He was a radio feature for a year until he signed off, but he is back on the air as an "aviation news commentator" for the Scripps-Howard newspaper chain. His program is to be heard each Thursday evening at 7:45 p. m. over NBC. Major Al is also Commander-in-Chief of the Scripps-Howard Junior Aviators. He writes a colorful, informative, aviation column daily for Scripps-Howard readers. His articles, of days gone by, in the Saturday Evening Post and in Collier's were read with avid interest.

Flying is a tonic for him and keeps him fit for his many duties. The first day of the week may find him in New York, Akron, or anyone of a number of towns, giving flying exhibitions because someone or some group, has asked him to help out in some project that is being sponsored. He lets aviation, in one form or another, tax his energies to the utmost.

Monday will find him most anywhere but Pittsburgh attending to some business matter. He generally flies to Pittsburgh on Tuesday, either in his trim little ship, the "Gulfhawk," or in a transport plane. He is much sought after as a public speaker, and may have several speaking engagements in one week.

He remains in Pittsburgh until Friday evening, as a rule, when he heads for whatever point he has promised to appear in the interest of aviation. It is a mystery where he finds the time to write his radio script and his daily column. He manages somehow to sandwich them in among the cares of the day, and to do a good amount of healthy reading daily, besides.

Major Al has made it a practice to hold open house in his office and his home for those who want a word with him and while he will, on occasion, be brusque, it is a manner and a subconcious defense born of necessity and the many demands upon his time. He isn't curt intentionally — wouldn't be — and would be amazed to learn that he is considered very abrupt by many people. He has never catered to personages. He likes the people he approves for what they are mentally and morally, and their station in life means nothing to him.

A picture of Mrs. Williams and her husband, published in *The Sportsman Pilot* of October, 1929, typifies their love of simplicity. They were seated on the steps of their Annapolis home, in the fashion of the average home-loving American couple. Mrs. Williams was wearing a plain, but appealing, white sleeveless dress, and "Lieutenant Williams," as he was then, was in "regula-

tion" U. S. Navy garb, but sans coat. He had been smoking a corn cob pipe and was holding it when they were photographed.

Al Williams loves children and, if he had one, the youngster would be almighty proud of him, not for his fame alone but because he plays the everyday game of life fairly and squarely. He is a giant physically, being over six feet tall, and having the proper weight for his height.

He is always neat in appearance, but, by no stretch of the imagination, could he be termed a fashion-plate type. If he wears a hat at all, it is likely to be several years old. When the "Gulfhawk" needs going over, he dons overalls and helps with the job. He is supremely proud and fond of Frank Tye, his mechanic.

June 23, 1935, was "Al Williams'" Day in Pittsburgh. The Scripps-Howard people sponsored an aeronautical treat to its Junior Aviators and to all others interested and, to the Major's embarrassment, dedicated the day to him and advertised it far and wide as Al Williams' Day. Fifty thousand people turned out to see the breath-taking show he staged and many others who wanted to see it, found traffic too heavy for them to reach the airport in time. A squadron of U. S. Marine planes from Quantico, Virginia, aided in making the day a gala one.

The Major is one of the most human of people, as he evidenced at the end of that memorable day, when he expressed a fervent wish that his mother could have been with him at the Pilots Club, at the airport after the show, when he acted as host to those who had helped to make the day a success. Al Williams worships his mother and finds that the days are not too crowded for him to mourn his father.

The people of Pittsburgh were paying a handsome personal tribute to Al Williams beyond a doubt for the largest crowd on the biggest day of Pittsburgh's Aviation Week, in October of this year, numbered only twenty-five thousand, just half of the number that had turned out to do honor to the Major. He participated in New York's Aviation Week Show and was lost to Pittsburgh.

Al Williams is one of several distinguished stunt and race pilots to take a position with an oil company. Jimmie Doolittle is another pilot who went into retirement with an oil refiner and who, like Al, has been making good in a big way.

Summed up, Al Williams is a man's man, who has had to fight his way in the world and who has done it in a do or die fashion. Speed is his watchword, and his fast logical brain performs unerringly whether he is doing aerobatics of the most thrilling kind in the "Gulfhawk" or is matching wits with business competitors. America can point to him with pride, even while regretting that his brains, determination and high courage are lost to its political life.

END.

Breguet Builds a Gyroplane

This is a recent picture of the new Breguet helicopter or "gyroplane" built by the famous French inventor.

LOUIS BREGUET, one of the very early aviation pioneers and a great inventor, has again taken up the problem of the helicopter as we see from the accompanying photo. This helicopter idea is nothing new with Breguet for he conducted extensive full-scale experiments with them 'way back in the days of the Wright Brothers.

No details have yet been released concerning this most recent of the Breguet direct-lift machines, but when the experiments have progressed further, we will undoubtedly receive some valuable information. If this machine is successful it will mark an epoch in aviation.

Lamentations by a Glider Pilot

by BILL MEYERS

THE way of a glider pilot is filled with difficulties. Not only is he discredited by motorcraft pilots, the very men who will ultimately benefit the most from his activities, but when he wears a club emblem to advertise gliding, they look craftily around for the nearest exit.

I have never found out why that expression of fear comes into their eyes. Do they momentarily expect that you will jerk out a gleaming quivering blade with which to extract their palpitating heart or do they wonder whether the keepers will soon be along to take Napoleon back to his castle? Whatever be the reason, it is very difficult to arouse any genuine interest in gliding.

There are various reasons why we have so few active gliders in the Puget Sound country. In the first place, our vegetation is so rank and luxurious that open fields are scarce. So if we fly, we either beg on bended knee for the loan of a portion of the airport or use any place that can be found.

Sometimes the use of such a field involves the making of a turn at the foot of the hill to avoid sundry obstacles as light poles, trees, fences, ditches, or a building. This is the situation for beginners and then add to this, a naturally skeptical populace holding back one of the most scientific and practical of sports.

Perhaps it would be best to analyze that situation more thoroughly. In the state of Washington are eleven identified gliders and one glider listed pilot. Who this man is I do not know al-

The author just after being catapulted from the hill.

though I could make a good guess. My home city with a population of about 400,000 has only two men actively interested to the extent of spending their time and money on the sport.

There was, at one time, a large group of active members in a local club. We started our experimenting back in '29 when it was all Greek to the few intrepid pioneers. Every method of launching was tried and the conclusion was reached that life was too short to waste it with hand launching.

It is amusing to read reports from Europe that auto launching is not to be used as it is extremely dangerous. Unless I am misinformed, our entire system of training in U. S. hinges on auto towing. At first we used shockcord starts but they proved to be too laborious for the spectators so having moved to another location an auto catapult was developed.

From there, the group went to a bluff, with a meadow at the bottom, for a try at that type of gliding. Finally, we drifted back to the airport to do some field towing on a short rope.

(*Continued on page* 384)

Mignet and the Pou du Ciel

by DR. J. E. GUY

Just a few personal remarks by a friend about Henri Mignet, the world famous designer of the Flying Flea. Know the man and know the history of his ship.

WE have been hearing more and more about this mysterious little flying-machine from France —how many there are under construction, how it flies, its motor, and how all these people manage to become the proud possessor of it.

You no doubt are also getting a lot of information on its technical makeup, horsepower, wing area, and other data, but so far as I have been able to find out, no one has mentioned the reason for such a plane and how its inventor arrived at such a fortunate solution of a problem which has haunted aeronautical designers ever since the Wright Brothers first took to the air.

It has been my good fortune to know Henri Mignet during my stay of seven years in France and I have had the opportunity to become acquainted with his keen practical philosophy and common sense during that time. I, therefore, must speak first of him in order to speak of his plane.

Henri Mignet is a small wiry man in his early forties, spare frame, dark hair, quick understanding eyes, and a very keen sense of humor. He was born in Eastern France, I believe near Soissons, where we Americans saw quite a lot of fighting during the war. He has always been a poor man financially and, after his fighting days were over, he found himself obliged to start all over again like many others.

His service in the French Signal Corps kept him near aviation fields and his officers made a joke of his absences, saying that Mignet could always be found in the repair shops helping the mechanics with the Spads and Nieuports. The practical experience he obtained thus stood him in good stead later on as we shall see.

His practical knowledge of planes

This is what we see when we sit in the cockpit of the Flying Flea.

This is the original Pou du Ciel built by Henri Mignet.

was as complete as possible in those days, but, as he says, the "regular" planes scared him. They did not work the way your reflexes dictated and to fly them, one had first to learn a set of artificial reflexes which sometimes quit the mind suddenly in an emergency with the result that the pilot invariably did the wrong thing and crashed.

He then summed up a list of problems for and against aviation and proceeded to try to overcome difficulties that were against his reasoning. He poses as an ordinary man of small means who wants to fly. To him, the sportplane is definitely out of the question. It is deficient, not by any constructional defect, but by being too perfect. It requires a pilot to fly it.

He strongly points out that the mind of the public has been intoxicated with speed. The public cannot believe that a plane is any good unless it can show a speed around 200 miles per hour. Therefore, the designers have built sportplanes, always modeled after their prototypes, the fighting planes; but—when they are shown to Mr. Public, the latter runs away badly scared. Here is a plane just off the drawing-board, out of the wind-tunnel and O.K'd by a crack test-pilot. It's a beauty with everything streamlined, standing there shining in the sun.

The Aeronautics Bureau is tickled pink to pass it with honors but, the designers and constructors have failed in the most important item. Only a qualified pilot may fly it, and that costs money, time and in lots of cases—discouragement.

Mignet says, "Here is a plane that answers every wish of the aviator. It climbs to 3,000 feet in 3 minutes, does 180MPH, seats two in tandem in order to favorize streamlining, etc., but no one buys it. Who wants to take one's wife on a honeymoon and speak sweet nothings through a rubber hose with your back turned to her? This may do for a professional aviator, but not for the man in the street who pays little but buys a lot."

"We must make a distinction between a war vehicle and one for pleasure. An automobile has wheels, and so has a cannon, but there the resemblance ends.

"I am not a pilot, and do not profess to be one. I am not built in a way that I can dominate my natural reflexes, and that is why the Pou du Ciel does not compare with the ordinary plane. Its speed is low, its power is also low, therefore, small cost of operation. It is practically impossible to wreck it while in the air, except perhaps by diving it vertically and pulling up too suddenly. Its strength then is no more than that of its flying wires. If this plane is used with an average common sense, there is no reason for any accident."

Let us see what this plane consists of. An unbelievably small fuselage about eight feet long with a tiny landing gear that makes it seem to slide on the ground on its belly. A main wing, six meters from tip to tip and a chord of 1 meter 40 Cm., a similar wing with only 4 meters however, but with the same chord. A rudder that seems a bit large for the rest of the plane, and a small two cycle Aubier-Dunne motor suspended over the nose of the fuselage by means of welded steel tubing, driving a propeller of 1 60 meter diameter with a pitch of 1.30 meter.

We are intrigued by the queer dihedral of the wings when seen from the front, and as we finally find the pilot's seat and install ourselves in it, the impression is an entirely new one. There is no rudder-bar. Only the joy-stick. By pulling it towards you, the entire main wing tilts up, and vice-versa when we push away. The second wing—for it is not a tail—does not move. The rudder answers when the stick is displaced laterally, and with a simple throttle placed within convenient reach, that is all one finds for the actual driv-

A glance at the power-plant of the Mignet Flea.

ing of this plane. An air-speed indicator, tachometer, compass, gas-gauge, oil-gauge, and whatever other instrument the owner may wish to install can easily be added, but provision is made for the instruments just enumerated.

The man-in-the-street is now ready for his take-off. A friend spins the prop for me and I let the engine warm up until it is ticking over nicely. When satisfied, I taxi for my take-off into the wind and give her the gun. After a run of about fifty yards, I have stopped bouncing. I have been told that I must not let my air-speed indicator drop below a certain figure. I am of the type who wants to see the wheels go round, so I gain a bit of altitude, and cut the throttle. I immediately get the sensation of falling, but upon catching up the throttle a bit, the fall is changed into a delightful glide.

The speed of my prop had dropped below the speed of the plane, and it was acting as a brake. A bit more gun, and I'll see how she can climb. A pull on the stick, the nose goes up, up, but it seems as if she's going to stall. Too steep. As the speed slackens the controls lose their life, but there is none of that sickening sensation of spin and drop.

The nose seems to come down, but the tail stays up until, after a little dip, I find myself again on an even keel. What has happened? The forward wing has acted in relation with the rear one to obtain the slotted wing effect, and the dangerous tail-spin simply did not happen.

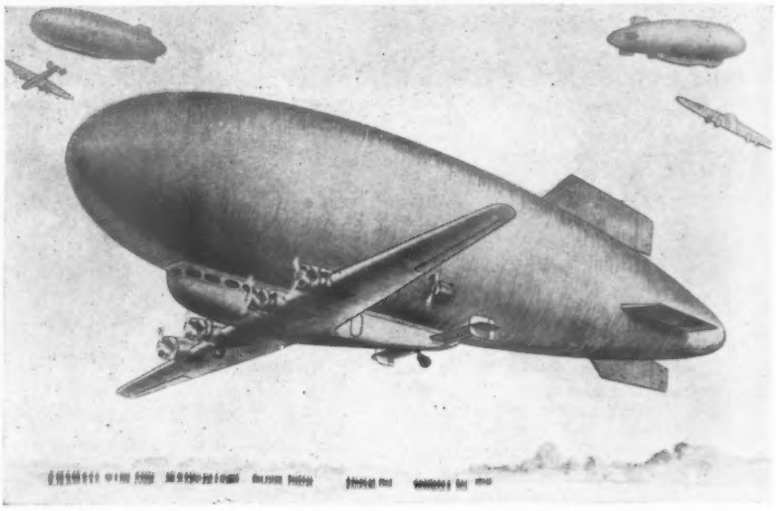
I go on my merry way after this and try a few turns. The stick is pushed to the left, and I find myself looking down with the ground on my left side. The nose seems to want to drop a bit, so I correct that by drawing the stick towards me. That is all. After a while, I decide to land, but had forgotten what my imagination had pictured for me for such a maneuver. I finally find the field and see the crowd waiting for me. Being anxious to crown my first flight with a professional landing, I become more and more anxious, and finally lose my head when I realize that I cannot properly gauge my speed and altitude.

I get so frightened that I cut the motor and freeze the stick against me hoping to hang on to something when the crash comes. I close my eyes and feel the ship nose up, stop, and then settle in a queer half swinging motion. With a prayer on my lips, I feel a not too disagreeable bump, and find myself still in my seat with the wings still in their places. As a matter of fact, everything is where I had last seen it, except that I am again on the ground. What happened?

The spectators tell me that I had come down vertically, and instead of laughs, I hear compliments. Upon thinking things out, I figure that by pulling on the stick, and cutting the motor, I had transformed my ship into an overgrown milk-weed seed with its para-

(*Concluded on page* 381)

A New Whaddyecallit for the Army



This is the latest proposal for the Air Corps, a combination dirigible and airplane.

A GLANCE at the photo elicits the surprised gas "what next"? It shows a combination airplane and dirigible proposed for the U. S. Army Air Corps, sponsored by Representative John Dingle, of Michigan, which is supposed to revolutionize air tactics—but will it?

In this architect's drawing, we see that the plane is being carried by the dirigible which should prove to be somewhat of a load. Just what prevents the dirigible from rushing up past the stratosphere when the plane is detached is not stated, but it is our idea that the problem of compensating ballast would be just one more of the very many critical problems facing the constructor of such a craft.

The airship and the airplane have the cabin in common while the plane is being carried, but when the plane is detached, the cabin remains with the airship as will be seen from the two small views in the upper right and left hand corners.

The DeHavilland Hornet-Moth Plane

THE DeHavilland Company, England, have recently produced a fine cabin plane with many noteworthy features. It is an example of the fact that the biplane type still persists in view of its many excellent qualities in spite of the recent wave toward low-wing monoplane construction. The Hornet-Moth shown here is just taking off from the DeHavilland airdrome in England, hands-off, it is said, but of course we cannot prove this from the available data.

It has a top speed of 132 m.p.h. and is said to be sufficiently near foolproof for it to be claimed as such. One novel feature is the overhanging cabin projecting beyond the lines of the fuselage. Another feature is the thin tapered wings which seem to have proved very attractive to English designers of late.

It is to be hoped that we will be able to get some data on the new wing form and its effect upon stability.

The new DeHavilland Hornet-Moth Plane

Trying 'em Out At Wright Field

by CHARLES J. BAUER

They take no chances with structural failures at Wright Field but try out the planes on the ground in all sorts of ways before they are allowed to take the air.

THE flashing yellow wings of a new model pursuit plane glitter in the sunlight on the operations line at Wright Field, Dayton, air corps procurement center, dazzling the eyes of a group of army test pilots.

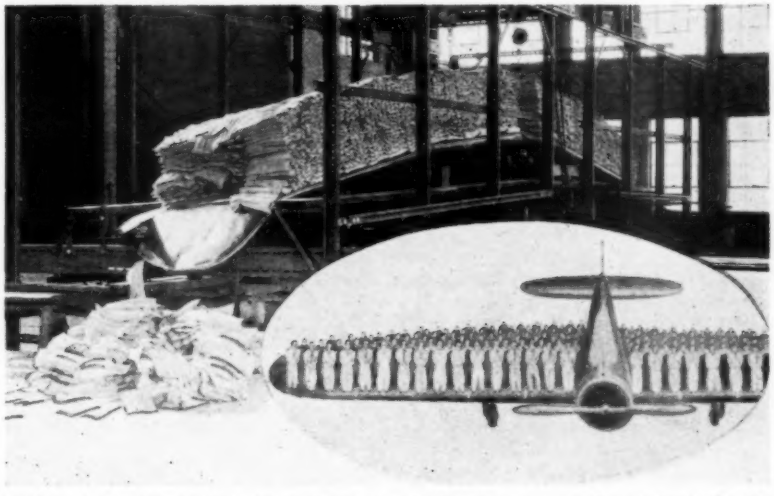
Each man wonders what the plane will do: how fast will it climb; how steeply; how will it respond to the controls? Is it speedy and maneuverable?

They itch to be at the controls, to take the ship aloft and find out just what it will do. Yet not one questions the plane's strength against the terrific strains of test flying. They know that the wings are strong and that the fuselage is properly braced, for long before the test pilots take a new plane up, army engineers in the ground test building at Wright Field put it to punishing tests duplicating battle conditions.

In one such test the plane, minus the engine and other delicate parts, is dropped from a crane to the concrete floor in as hard a landing as a dazed pilot might make on a rough field. Other tests require sandbag loads as great as 40 tons on one small monoplane.

This system of testing has led the army to buy nothing but monoplanes, for it has shown them that with new alloys and internal bracing, the monoplane (all birds are monoplanes) is superior to multi-plane craft. Biplanes are still in use by the army, but none have been bought for several years.

Just as in the air, they are the principal supporting members, the wings must bear the brunt of the ground test loads. If instead of sandbags, the wings were loaded with men standing as close together as possible, each with another man on his shoulders, their combined weight would be less than that of the bags.



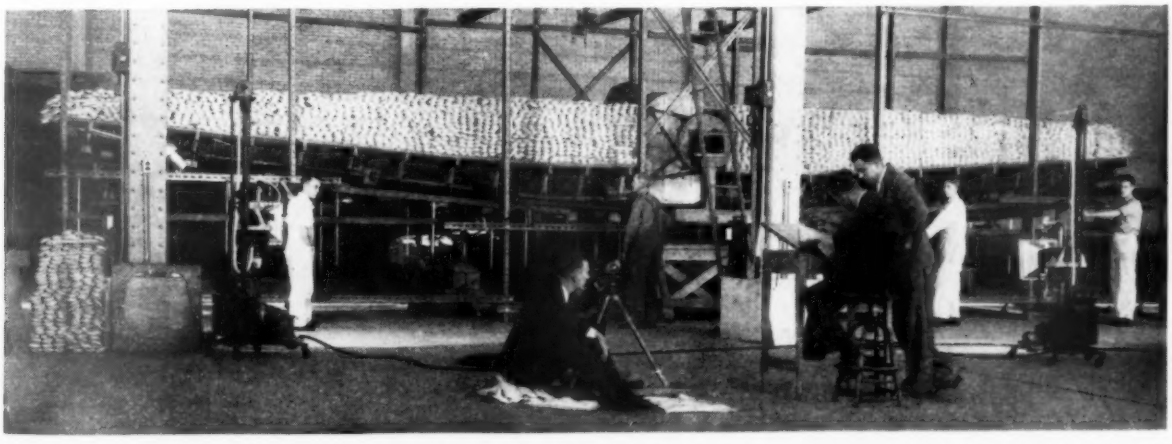
ABOVE. This wing, loaded with sandbags, has finally given away under the load. In this way, the stress calculations are given a checkup. IN OVAL. This shows the equivalent of the sandbag loading in terms of men.

Occasionally the tip of a wing snaps, dropping the load to the floor, but though the wing apparently holds up, it may be distorted or the bracing may give way.

The rigors of ground or drop testing are calculated according to the type of plane. Thus greater structural strength is required of the fast-moving pursuit, attack and bombing planes than of the comparatively slow observation, scout and transport craft. The bomber carries far the heaviest load, but pursuit and attack planes are built for manuevers not contemplated for the bomber. These smaller, lighter planes, in coming out of a dive or in changing direction, withstand wing loads eight to ten times as great as in level flight.

The amazing performance of the newest bombers, however, is compelling engineers to resort to tests as severe as though they actually were intended for diving and dog-fights. The four-motor Boeing craft that crashed recently at Wright Field flew from the west coast at an average of 233 miles per hour—only a few miles an hour less than the winning speed of the Bendix trophy race several weeks later over nearly the same route.

This speeding-up of bombers has raised requirements of pursuit planes and, in lesser degree, of attack planes. Now, when you get speeds of 300 miles per hour (the new Seversky single-place pursuit will do that), atmospheric im-



Here we have a sandbag loaded wing under test. The inspector seated on the floor in the foreground is provided with a transit or level by which he reads the deflection of the wing at each load. The men at the right are recording the readings.

pact is terrific. The air then has the same resistance as water at lower speed.

Imagine the air as flowing water, with eddies, whirlpools, falls, cascades and fountains. Then think of the plane as a boat—not a boat floating on the water but immersed in it—and you have a fair conception of what a speeding plane encounters.

The static tests sometimes are carried to destruction; that is, beyond the elastic limits of the members. Proof tests, on the other hand, show that a member can withstand a specified load, and are not expected to cause damage. If they do, the faulty member is redesigned or strengthened.

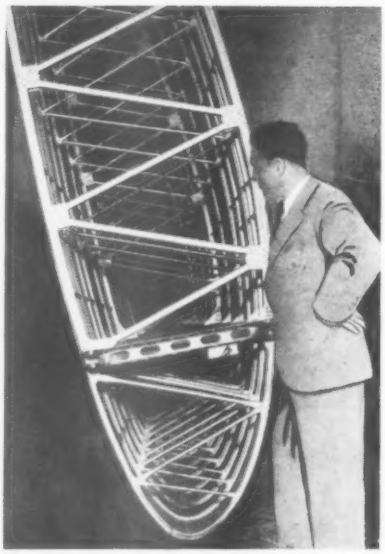
Lead bars replace sandbags in testing compact surfaces such as engine mounts, and lead shot is applied to the fuselage. Horizontal tail surfaces are mounted on the fuselage for test. Weight units are imposed in increments, the size of which is diminished gradually as the breaking point is approached.

Elevator tests involve recording of the pounds of pull required on the control stick at the point where the pilot would grasp it, and aileron tests require measurement of the side pull on the stick. In testing the vertical tail surfaces the pull on the rudder bar is noted.

The wing-testing jig is a massive arrangement of vertical I-beams forming a rigid upright plane to which the wing is bolted as it would be attached to the fuselage. Yardsticks are suspended at intervals from the lower surface of the wing, and deflections shown on the metered sticks are observed through a surveyor's level.

The jig weighs 52 tons above the floor, but absolute immovability is assured by 228 tons of concrete and steel anchoring it in place. Thus the observer knows that each deflection is in the wing itself.

Two other methods of recording deflections are available. In one, electric lights are substituted for the scales, a method suitable at night. A more elaborate method employs an electrical device known as a telemeter. The degree of deflection under load at a given point is transmitted to the telemeter by electrical impulse from one of a number of



Showing the complex interior construction of a metal wing.

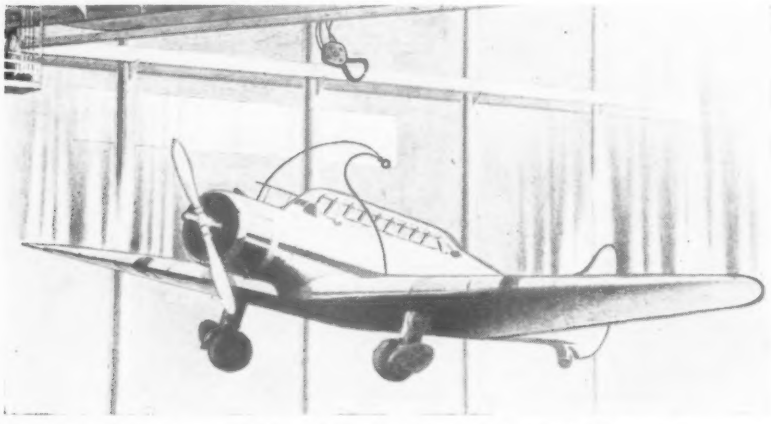
wires terminating at various points inside the wing.

As each new weight is added, an exposure by a camera in the telemeter records the resulting deflection.

The load is not laid directly on the wing surface but on a flat flexible wooden superstructure that permits load distribution ahead of the leading wing edge or behind the trailing edge.

In normal flight the stresses on wings are generally upward, but the reverse is true at certain points in dives and acrobatics. Thus the ground tests impose loads on planes in flying position as well as upside-down.

Savings in lives and money far out weigh the government expenditure for ground testing, air corps officials say. But engineers also are aware that the ground tests reveal weaknesses that might escape the test pilot. Moreover, a plane that crashes because a wing has parted from the fuselage, or something else fails, often carries with it to the scrap heap the secret of the exact cause.



Here, the hook has been released and the plane drops on the hard floor to determine the strength during a hard landing.

Identifying Controls

THE European airplane industry has decided to use standard colors for the identification of operating parts of airplane equipment.

The standard colors are considered to be an important safety device because of the large number of pilots who frequently change planes, so that familiarity with the location of controls and equipment is important. The standards, which also are being accepted by other European countries, are:

Red—to be used for handles, handwheels, etc., of fire extinguishers, fire alarms and short-circuit switches.

Green — Temperature regulator for cooling water.

Yellow—For throttles.

Brown—For temperature regulator for lubricating oil.

Black—For ignition levers.

Airmail Has Great Volume

IT is hard, sometimes, to realize what a vast amount of United States mail is carried by airplanes to the countries of Central and South America and the West Indies.

Not long since, a single shipment of first-class mail, leaving Miami for Havana, Cuba, weighed more than a ton, or exactly, 2384 pounds. Pan American Airways carries this vast poundage in the giant Clipper ships which make the round trip daily between the two countries.

In addition there is an immense amount of air mail sent from the Miami Post Office to other foreign countries.

Boeing Students Cross Continent

THE Boeing Model 80 trimotor, a plane from the Boeing School fleet and the largest transport aircraft used in a commercial school, recently made a cross-country trip from Oakland to Los Angeles and another from Oakland to New York.

George I. Myers, Director of Flight Instruction at the Boeing School, was chief pilot and students John Peacock, Robert Fields, H. Mills Hollinger, Dale Scott, Robert Branson, Roger Folwell and Nat Paschall acted as second pilots.

On trips of this kind the ship operates on regular schedule just as though it is on a regular scheduled flight, and receives and sends radio messages on an assigned sequence at regular stated intervals.

The ship reports to the ground, locating position and giving the weather conditions, and receives the latest weather conditions at the next destination.

Up in the Air

AN airplane as correspondent in a divorce suit is reported in Los Angeles. A business man obtained a divorce sometime ago on the ground that his wife, a licensed pilot, "just literally flew away and left me."

Balloons and Balloonatics

by T-2003

A few remarks, from an authentic source, upon the value of captive balloons, kite-balloons and drachens in actual warfare. There always has been a tendency for airplane pilots to discredit and minimize the importance of the lighter-than-air division—so here's the answer.

IT used to be said, during the World War, that you really never saw how the war was progressing until you had witnessed the martial panorama from the cozy little rattan basket underneath an observation balloon.

And, if you thought that the average lighter-than-air observer or "balloonatic" led a very prosaic life up there a half mile above the earth at the end of a stout cable, you should have stuck around until the Heinies sent over a couple of Fokkers to knock off a particularly bothersome sausage. Or, vice-versa, if you had preferred to see the American lines from a German "Drachen."

Not only were those observers crack artillery-men but many of them outdid our present day professional parachute jumpers. Several jumps a day for several days running. Not for glory or exercise, either, but to save their lives, which is a pretty good excuse for taking to the 'chute in peace or war.

Most laymen, and even many World War veterans think of the sausage as a mighty big and vulnerable target for marauding pursuit aviation. Frank Luke's exploits as a "Balloon Buster" are well known to air-minded Americans. One mentions "balloons in the next war" and is laughed at or shouted down as not knowing that the airplane is here to stay and the gas-bag is a thing of the past; something which, like the dinosaur, cannot survive because of its bulk and sluggishness.

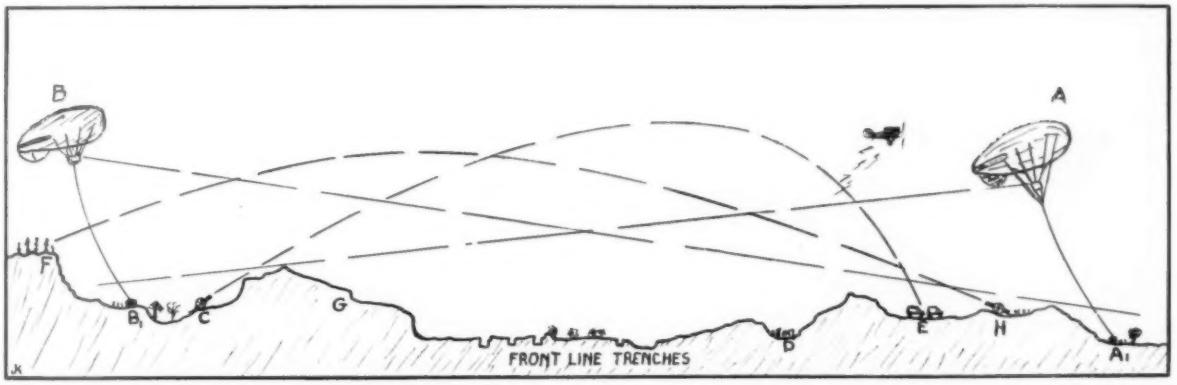
A number of keen military observers, however, think otherwise. Also some practical and experienced military airmen. One of them, Lieut. Leo Dawson, World War air hero and still in the regular Air Corps, described to the author an example of the military importance of a single balloon during the late fracas. The *entire pursuit squadron* of which he was a member was once ordered aloft for the specific purpose of bagging a lone German "Drachen" whose crew were reporting on the advance of two American divisions, to the intense delight of the Teutonic artillery-men and machine-gunners who knew just where to aim their guns. To call out a squadron on a specific mission is not done except for good cause. Here was the case of a single balloon considered important enough to employ eighteen Spads in its neutralization.

A smoke screen is one of the few methods that can successfully obscure the sight of a prying observation balloon. The plane shown here is laying a screen around New York City.

This balloon-busting and not the balloon itself may be absent in the next war when helium, non-inflammable and only slightly less buoyant than hydrogen, takes the place of the latter in the insides of the American war-sausage. This will be described later in this article and we may next consider the need for balloons in warfare, how they support the ground arms and why they are of immeasurable advantage to the air force as well.

War is fought as much behind the battle front, in the marshalling of finances and industries, as up in the front lines. That's why bombers go after such things as munitions factories, financial centers, docks, etc. In this, as in other countries, it will be many months before military aircraft factories can be whipped up into emergency production to turn out bombers, attack observation and pursuit planes needed at the front.

So many of each type of airplane will be needed to do the job assigned to the entire armed forces of this country. With ground-arm influence strong within our



Observation balloon (A) has a good view of the front line trenches but cannot see the enemy balloon crew at (B') nor the field artillery at (C). Enemy balloon (B) has a good view of the front line trenches, the transport trucks (E) and the artillery (H) as well as the back areas but cannot see the infantry concentration at (D) nor the balloon crew at (A').

War Department you may be sure that no division or corps commander is going to lack the aerial observation he thinks he needs, even if the Air Force suffers.

Now if the balloon, which can be turned out cheaply and quickly, can replace the short-range reconnaissance plane in the performance of observation missions, it means so many more airplanes of the observation or any other type available for the highly important Air Force squadrons.

It, therefore, behooves the air-minded among us to encourage, rather than discourage, the observation balloon idea if we believe the next war will have its most decisive blows struck far back of the doughboy front by our bombers and attack planes.

As to the tactical employment of balloon units, we should consider the balloon as an elevated observation post. The present type of hydrogen filled balloon flies up to 4500 feet high. The distance of the balloon from the front lines varies from ¾ to 5 miles. Dependent upon the atmospheric visibility, an observer can generally see and report enemy activities within a radius of 11½ miles from the ascension point.

The unit operating the balloon is a balloon squadron with one active and another spare balloon. The basket crew consists of two observers. Ordinarily, each infantry division will have a balloon squadron working with it and furnishing part of its aerial observation, the remainder of the division's aerial observation being performed by an observation squadron equipped with thirteen airplanes.

Except for the few oscillations of the balloon and basket, the observer may be considered as being on a high mountain top with a constant perspective of his objective. That is, he views his objective always at the same angle. Furthermore, there is no need for the observer to reorient himself every time he sticks his head over the side of the basket as he would have to do were he in an airplane.

Permanence of observation is the balloon's principal advantage. The observer's observation is continuous and he can learn his zone in detail. Every road, cross-road or important point which he sees, he can study during his first ascension.

Thereafter, any change in the disposition of the enemy, any unusual activity at one point or another in his zone will catch his eye. He is liable to be jumped by an enemy pursuit plane at any time, yet he need worry very little about that. The squadron has a Defense Section armed with machine guns which keeps a vigilant watch for such an occasion and cuts in on the phone to warn the observers that it is time to jump.

And get this, you who think air discipline is found only in the formation-flying-heavier-than-air outfits—in a well trained balloon squadron the observers keep at work until the Defense Officer yells "Jump!" into the phone transmit-

(*Concluded on page 362*)

Believe It or Not—A Nieuport Triplane

PRIOR to the World War, during the War and after, Eduoard Nieuport was a consistent and persistent experimenter. The first innovations from this source began with the little Nieuport sport-monoplane 'way back in 1910, which was the first plane to be provided with a distinctly evident streamline fuselage and thick wing sections.

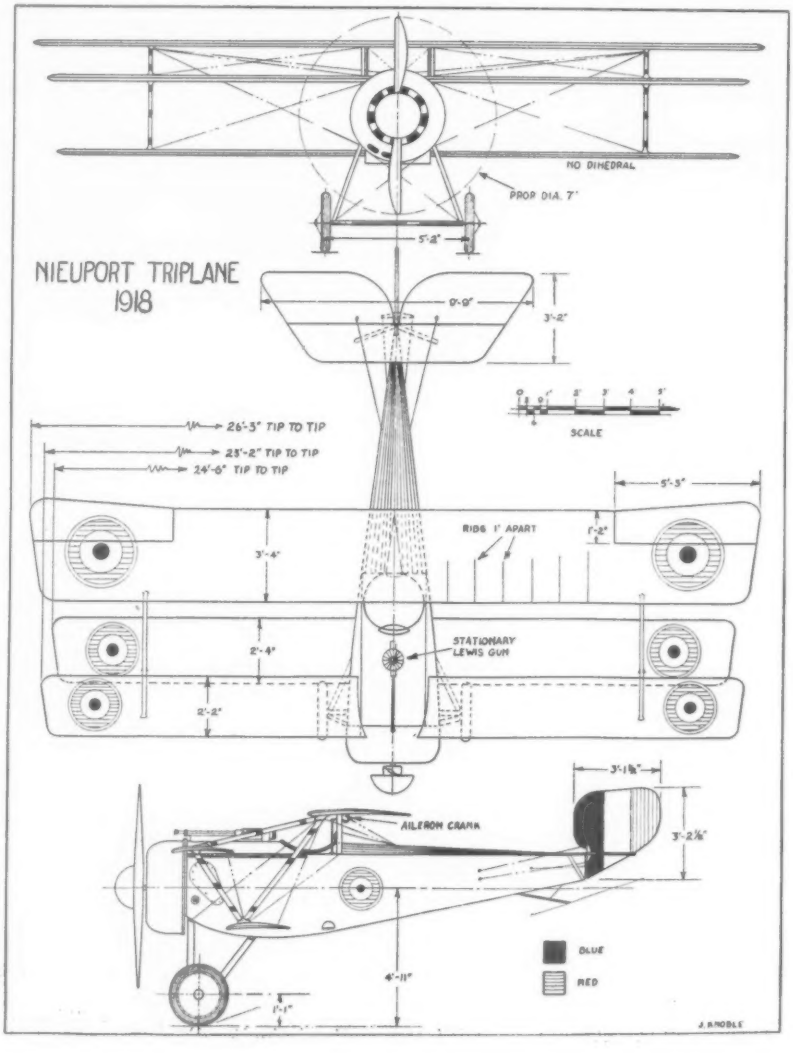
Then followed, in rapid succession, a whole series of different designs of a novel nature, including monoplanes, biplanes and triplanes. But, however varied their design might be, each plane bore the characteristic mark of its designer and was distinctly a Nieuport construction even at first glance.

During the Big War, Nieuport attempted the most radical departure of all and built a ship of which but few have heard. This was the triplane of which we attach the outline drawings, a plane that probably was inspired by the Fokker triplane. The most interesting feature of this triplane is the staggering system adopted which practically gave a full unobstructed aspect for each wing.

The lower and center wings formed essentially a steeply staggered biplane cell, while the third and top wing was placed so far back that it was essentially a negative stagger. It is obvious that the designer made an attempt at a dual biplane arrangement in which opposing c.p. travel elements canceled out. So far as we are aware, no official reports were ever issued on the outcome of the experiment or on the performance of the plane.

It is quite interesting to recall that there was quite a scurry in triplane design during the last years of the war in which Nieuport, Fokker, Sopwith and others took part, and apparently, the triplane really offered advantages in maneuverability that have since been overlooked or ignored.

It would seem advantageous to revive the triplane idea and to give it a real tryout, in view of the modern cantilever constructions that eliminate the worst feature of a triplane—parasitic resistance.



Are Silent Propellers Possible?

by LAWRENCE A. CLOUSING, Lieut. (j.g.) U. S. N. R.
Instructor of Aeronautical Engineering,
Northwestern University.

Propeller noise, the most objectionable of noises made by the airplane, is now being given intensive study, and much of the data obtained is set forth in the following article.

UTTER and complete surprise air attack is the hope of any air attacking force, and the dread of any air defense.

At present, the probability of complete surprise is quite remote because airplane engines make noise, and propellers make more noise. It is possible, however, to muffle engines, but propellers cannot be muffled. It is possible to reduce propeller noise by reducing the speed of a propeller, but this does not eliminate the noise. There is still a considerable amount of noise.

If a propeller could be silenced, it would be a great air attack boon.

It would also be a boon to commercial aviation if a propeller could be silenced. Such an accomplishment in dollars and cents would be beyond question in the increased use of air transport by travelers.

Therefore, with characteristic scientific methods, the National Advisory Committee for Aeronautics recently attacked the problem of eliminating propeller noise. Scientists E. Z. Stowell and A. F. Deming were the members of the N. A. C. A. staff assigned to this problem.

They reasoned thus: "It is very hard to conceive of a way to eliminate propeller noise, but if we gain an idea of just what makes propeller noise, what it is like and where is is likely to be heard the loudest, we will contribute something." So they set to work on the problem, and their results are interesting.

From work of previous experimenters they know that air going past a round wire makes a noise. The Aeolian harp was devised by the ancients. In this harp wires were stretched on a frame, and when the wind blows, musical notes are produced. The tone of the musical note depends upon the size of the wire and speed of the wind only, and not on its tension.

Scientist Strouhal, years ago, developed a formula which gave the tone of the wire in terms of wind velocity and wire diameter. Lord Rayleigh showed that the loudness of the musical note was greater if the tension of the wire were such that the wire vibrated in frequency with the musical note.

It remained for Von Karman, California Institute of Technology, and Ruback to give a definite physical explanation as to the cause of the musical notes. They found that only when vortices were released alternately from each side of a rod were very definite musical notes sounded. See Figure 1.

Part of the propeller noise is due to these vortices, thought Stowell and Deming. Therefore they started their investigations by studying the noise from whirling rods.

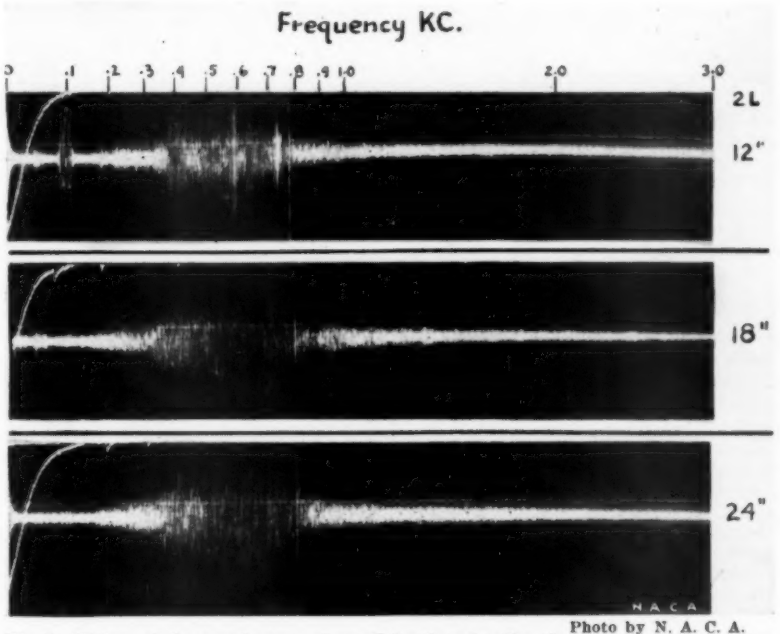


Photo by N. A. C. A.

Fig. 2. Picture of the sound-waves given off by three lengths of rotating rod, each rod so adjusted that the tips speeds of all rods are the same. The frequency shown by figures is in thousands of cycles per second.

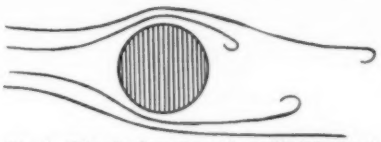


Fig. 1. The air-flow around a cylindrical rod makes a singing noise if the vortices are released alternately from opposite sides of the rod.

They took a rod one-half inch in diameter and cut one piece off 12 inches long, another 18 inches and another 24 inches. Then they mounted these on a hub located at the center, just like a propeller, whirled them by means of electric motor, thus eliminating engine noise, and listened. They listened not only by ear, but also by an electric ear. The electric ear is interesting because it could pick up the sounds from the rod, classify them, and then put them out in the form of a visible record.

Interesting is one result of this experiment. It showed that sound pressure is greatest directly ahead of a whirling rod or directly behind it, but is practically zero in the plane of rotation of the rod.

Sound pressure is a measure of the actual variation in pressure in the atmosphere produced by a noise. The changes in pressure produced by a noise are very very slight, being in the neighborhood of 1/100,000 of a pound per square inch for a loud noise. Human beings may hear exceedingly small sound pressures. The decibel is the unit which expresses sound pressure in terms of loudness.

Peculiar is the addition of sounds. If one loud sound is present and another loud sound equally loud is made, the combined effect of the two sounds will be little greater than before. This is reflected in the decibel scale by the fact that a noise of 40 decibels plus another noise of 40 decibels gives a noise of 43 decibels.

Thus, although the sound pressure is greatly different at various points around the whirling rod, the variation in the loudness of the noise is not nearly so great.

Results of the whirling rod experiments also showed that it was the speed of the tip of the rod through the air which governed the amount of sound given off. The speed of rotation in itself had no effect.

This fact was demonstrated by rotating the 12-inch rod, the 18-inch rod and the 24-inch rod as such revolutions per minute that the tip speeds were all the same. Figure 2 shows that the frequen-

XUM

cies of the noise produced were similar in all cases and also the loudness of the noise (indicated by the height of the waves) was equal.

It is also shown in Figure 2 that a whirling rod gives out noises covering a wide range of frequencies. This is because the inner portions of the rod travel less fast than the outer portions and hence produce sounds of lower pitch.

When a propeller was substituted for the rod, and set up as shown in Figure 3, results were different. It was found that the sound pressure was now greatest directly behind the propeller. It was also found that the higher pitch sounds were greatest in front of the propeller and the low pitch sounds greatest somewhat behind the propeller.

Strange also was the finding of a new sound of low pitch, which was not present in the whirling rod.

It was found that the frequency of the noise was exactly equal to the number of propeller blades multiplied by the revolutions per second, or in other words the noise depended on the speed of rotation. It was given the name of rotation noise, and was found to be by far the largest part of propeller noise.

Furthermore, it was found that when the power supplied to a propeller was increased, the rotation noise became much greater. A picture of the sound frequencies of the propeller is shown in Figure 4.

However, even though the sound pressure is not uniform around a propeller, the loudness as heard by the ear does remain about the same. This is because of the characteristic response of the vibrations mentioned before.

Stowell and Deming's research showed that the two-bladed airplane propeller is one of the most powerful sources of sound known, being much more efficient than a steam whistle in converting power into sound. This work showed also that a propeller emits a very complex sound, being unique in this respect among devices for making sound. This is disappointing because it eliminates the possibility of filtering any noise out.

Photo by N.A.C.A.

Fig. 3. Studying the noise made by a two-blade propeller on a special test-stand. Tests made by E. Z. Stowell and A. F. Deming. A silent electric motor is used.

Stowell and Deming showed that, in addition to rotation noise and vortex noise, a propeller may sometimes give off a flutter noise which may be very great. However, flutter is a condition to be avoided in any propeller design, and so should not contribute to ordinary propeller noises. Hence its noise effects were not studied.

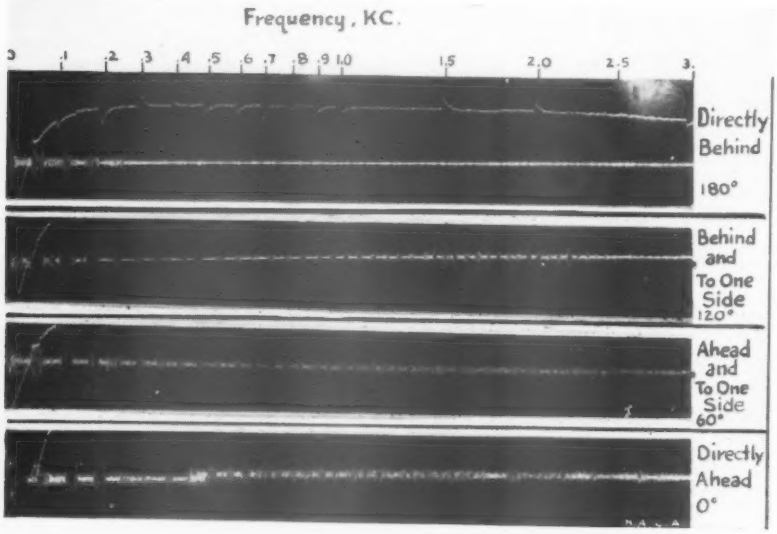


Photo by N. A. C. A.

Fig. 4. Picture of the sound-waves given off at different positions around a rotating propeller. The sound frequencies are seen to be ahead of the frequencies given off behind the propeller.

Under certain conditions, also they learned that a very pure note is given off by the propeller which seems to be due to a pressure oscillation about the propeller blade. As this occurs but rarely, this source of noise was not studied.

These studies show scientifically why an approaching airplane has a high pitch whine and why as it speeds by the whine changes to a booming roar. Previously this has been explained only by the principle of sound waves in movement; i. e. the waves from an approaching object being closer and consequently higher in pitch than the sound waves from a receding object.

By means of the sound filtration apparatus developed at Langley Field, the noise from an electrically driven propeller was made to sound like a plane passing by in flight. A microphone was placed in front of the propeller to pick up the noise.

By filtration, first, only the high pitch sounds were allowed to come through. These were amplified and given off by a loud-speaker. Then the frequency was lowered and the roar of the propeller was picked up, the whole effect being similar to one experienced in watching an airplane at an air race. When all the propeller noises were allowed to come through the filter, an impression was gained of a squadron of airplanes in flight.

Tests have also shown that, because of the absorption in the atmosphere and also because of distortion of noise of high frequencies by the ear, only the low notes are heard either at very great or very short distances from a propeller. At ordinary distances the vortex noises from the propeller are heard also, and they make the swish or tearing sound which is most readily heard directly ahead or behind the propeller.

This condition is easily verified by the man on the ground when an airplane flies past overhead. The pitch and tone very noticeably vary in the different attitudes and positions assumed by the plane in flight with the propeller turning at a uniform speed. The vortex sounds give the "rag-tearing" sounds on the approach and retreat of a plane, with the plane pointed toward the observer.

From the standpoint of the occupant in an airplane the "roar" or rotation noise is the most objectionable because it interferes greatly with speech. Furthermore, it is very difficult to insulate against the roar in the cabin of a passenger airplane. This noise also has its maximum effect in a direction directly outward and somewhat behind the propeller.

As a result of their researches Stowell and Deming conclude that no great improvement can result from any scheme of silencing that does not first reduce the propeller "roar," or rotation noise. As no means exist for eliminating this roar at present, silent propellers do not seem possible.

END.

Review of Recent Books

PRACTICAL AIR NAVIGATION AND THE USE OF THE AERONAUTICAL CHARTS OF THE DEPARTMENT OF COMMERCE, by Thoburn C. Lyon. Special Publication No. 197, U. S. Department of Commerce Coast and Geodetic Survey, Washington, D. C. Write to The Director and send 30 cents.

THIS booklet treats of chart-reading and the three principal methods of air navigation: piloting, dead reckoning and radio navigation. In a final section a number of practical examples are worked out step by step. Several new short-cuts and graphs are presented for the solution of navigational problems. The text is further rounded out by the inclusion of typical portions of two published charts, printed in full color.

The aeronautical charts of the Department of Commerce are published on the Lambert conformal projection, which affords many advantages for air navigation in the United States. This new publication sets forth in clear and non-technical language the simple methods and procedure made possible by the use of this projection. We believe that this booklet will enable all pilots to become familiar with these methods and increase greatly the usefulness of these charts.

* * *

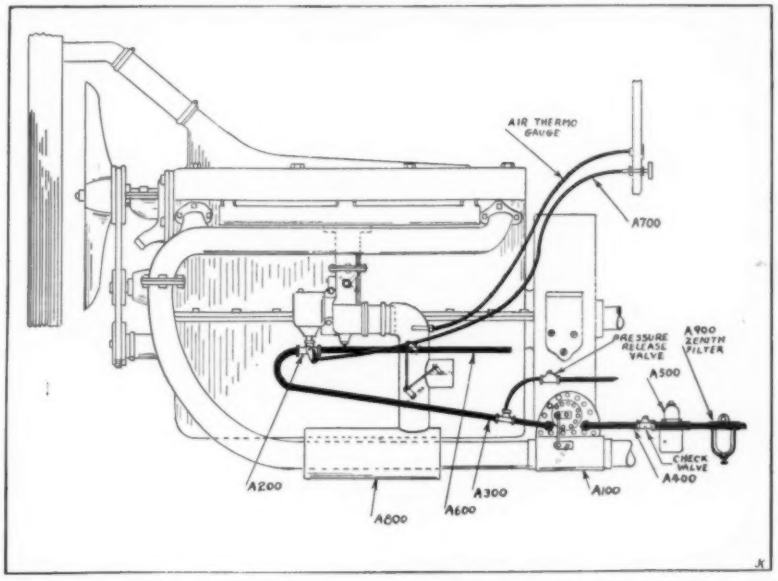
THIS FLYING GAME, by Brigadier General H. H. Arnold and Major Ira Eaker, 1936. Cloth bound, 275 pages, lavishly illustrated. Funk & Wagnalls Company, 354 Fourth Avenue, New York. Price, $3.00.

THIS is a book that tells exactly what people want to know about aviation—not only to those with a special interest in flying or who want to become aviators, but also to every one who has the slightest curiosity about this amazing development. General Arnold tells in his authentic and inimitable way of the technique of flight, the making of airmen and airplanes, aviation's present problems and hopes. Since 1911, he has been not only a pioneer but part of aviation history in an active and commanding way.

The authors make prophesies concerning the future of aviation, an understanding of which is necessary to judge the course of the world's immediate history. After reading the extraordinary advance they describe it is easy to believe that still more amazing developments lie ahead of us in the aviation industry, which affects all other trades and may soon surpass many old ones. The chapters on the technical aspects of the industry and the sort of men it employs should interest every one.

The countless questions of eager air-minded boys and their elders are competently handled by one of the foremost flyers of his day and perhaps the one best equipped, because of his experience as Commanding Officer of March Field, to speak on the subject of training. "This Flying Game" is indeed the most up-to-date and most interesting volume on flying available to those who wish to be informed and is written in pleasant, readable style.

Converting Gasoline Engines for Fuel Oil



This is the layout of the Nuway fuel-oil burner as applied to an automobile engine which will show even greater advantages in aviation.

AN improved method has lately been developed for adapting conventional gasoline engines into fuel-oil burners by the Nuway Engineering Corporation. The adapter has undergone thorough dynamometer and road tests over a period of 3 years, at an expense of nearly $50,000 and is now in production at the plant located at 2040 Livernois Avenue, Detroit, Mich.

The conversion has been made on a number of engines, formerly using No. 1 grade gasoline, to the use of No. 1 fuel-oil available at most all bulk fuel stations in this country. The fuel-oil used is a 36° Baume gravity, 155° Fah. flash point having a distillation test of 10 percent. at 394° Fah. and 90 percent. at 465° Fah. and 41 octane rating.

Tests have been made on marine stationary and truck engines and several conversions have been made on passenger cars with excellent results. Dynamometer tests at full throttle maintain gasoline power with decrease in volumetric fuel consumption averaging 20 percent. Truck tests at road loads show an increase in mileage greater than 30 percent. Besides the advantage of increased efficiency, is that of the difference in price of the two fuels. In most localities fuel-oil is about 35 percent. less than gasoline—both less taxes.

The improved construction permits the conversion to be shipped ready for installation. The change-over can be made by service stations or a mechanic in 8 to 10 hours. Enlargements to plant facilities are now under way to care for unfilled orders on the books.

Tex Tries His Hand on the Controls

You say I can't learn to fly in a day, that it will take several months at least? Well, I'll be doggone. I can break any hoss to ride in a week and they got sense enough to be mean and stubborn, and I thought that one of these mechanical critters with no sense ought to be easily handled. I can take my first lesson today? Well fine . . . I guess I am ready now, if you think that these spurs won't get in the way any. Somehow I just feel better with them on, if you don't mind.

When you shake the stick you mean that I can take control? All right, I'll just barely touch them until you tell me to, through the Gosport—Oh, you mean those tubes to talk through? Mister you don't need to tie me down with this here safety belt-thing, as the meanest horse in Texas couldn't throw me off. Yessur, I understand all about them control things, because I been reading about them in the Sunday supplement of our paper.

Doggone, this sure is fine up here. I'm going to show that airyplane feller that it won't take me no "several months anyhow" to learn to ride this sky-horse without no pitchin' and buckin'.

Well, I declare. He's shakin' the stick and he says for me to take it . . . Why, it's just as easy as eating pie off of the kitchen table. I knew I could do it all the time. . . . No it's not so easy. He says for me to nose it down.

Oh yes, you pull the stick back to do that———Phew———No, you push it forward———, but not so much as I did

(*Concluded on page* 385)

U. S. Far Behind in Air Defense

THE United States is lagging so far behind in air preparedness that, in the event of war, this country would not have a plane in the air after the first month of intensive operations, according to William Henry Beatty, vice-president of the Air Reserve Association of the U. S. in an article on "First Line in the Air" in *The National Aeronautic Magazine*.

"During intensive air operations, experience has shown that a pilot cannot be kept continuously on flying duty for more than three or four weeks before having to be relieved for rest," Mr. Beatty said. "Discounting, therefore, all losses from enemy fire and inevitable crashes, if trained reserves are not prepared and equipped to instantly replace the regular pilots, after the first month of intensive operations our air force would not have a plane in the air.

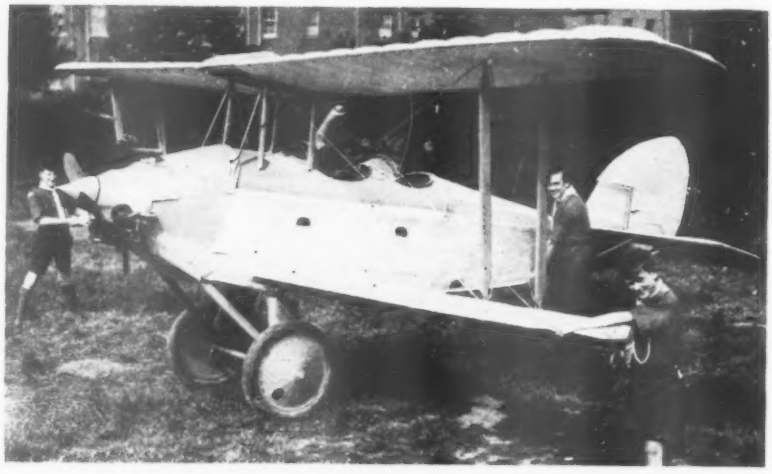
"Even on the occasion of the minor domestic emergency two years ago when the Air Corps was given the task of flying the mail, 138 of the pilots assigned to this duty were 2nd Lieutenant Reserve pilots. It is apparent that the Air Reserve must be regarded as an indispensable and inseparable part of the nation's first line in the air. Indeed the term 'Air Reserve' is inaccurate and misleading. The term 'Civilian Air Force' would probably be a more fitting and appropriate name for this component."

Mr. Beatty stressed the need of passage of an Air Reserve bill H. R. 4348, designed to establish within the Army an air reserve and to equip and train this component. The bill has been introduced into the House by Representative John J. McSwain, of South Carolina, Chairman of the House Military Affairs Committee.

"Our regular Air Corps is numerically pitifully small," he said. "As of June 30, 1935, there were but 442 Air Officers in the continental United States assigned to duty as pilots of combat squadrons. The Air Reserve Association believes that the responsible members of Congress and commanders of the Regular Air Corps recognize that upon occasion of a major military emergency the reserve pilots would greatly outnumber the regular pilots of combat squadrons.

"The ideal of the Air Reserve Association is eventually to have established a network of Reserve combat squadrons located throughout the country, readily accessible to all Reserve pilots and equipped to take the air instantly as effective fighting units. The nation has an invaluable defense asset in the Air Reserve. At present this asset is frozen, devitalized and is being permitted to disintegrate. The Air Reserve Association entertains no design to build an organization separate and apart from the Regular Air Force. The Reserve component can attain its fullest degree of effectiveness only when bound and developed inseparably with the Regulars."

English Boy Scouts Build a Plane



And here's the ship that the English boy scouts completed and flew.

WE have the great pleasure of showing a fine two-seater lightplane built by a troop of English Boy Scouts under the tutelage of their scout-master. Whether the Boy Scouts in England have a special licensing agreement with the government is not known, but we know what would happen to the Boy Scouts on this side of herringpond if they started in to build a ship.

Building the "Piffle Pusher"

by RAY L. LARSON

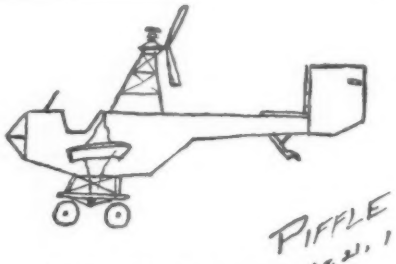
FROM the wood-shed laboratories of Prof. O. G. Piffle, America's self-taught aircraft engineer, come these complete plans and construction notes for the Piffle Pusher. This unique innovation was designed with the interests of the home aircraft builder at heart.

The Professor himself told me, "The simplicity of design and method of construction bids well to cut down the number of casualties among amateur builders." You have only to glance at the accompanying side-view drawing to understand that the above statement is obviously true. The safety of the machine lies in its low cruising speed, and its inability to leave the ground except in a Kansas tornado.

Let us first consider the fuselage. Its most impressive feature is its radical contour, probably due to the fact that the professor is of Russian extraction. The materials for construction consist of four three by six oak longerons and a used bridge girder to be cut to the proper lengths and used for vertical, diagonal, and moral supports.

Bolt these members securely at proper junctions with healthy tie-bolts, reenforced with gas pipe wherever necessary. The result is a fuselage strong enough to pass the Air Commerce requirements ten times and a fraction over.

Next, mount the landing gear. The choice of this item is left to the discretion of the builder. But by way of suggestion, the professor says that a four wheel truck from a discarded Pullman car makes an excellent undercarriage which will prevent nosing the machine over while your friends are pushing you around the yard.



Side Elevation of the Piffle-Pusher.

The wing construction is simplicity itself. It consists of two spars and ten ribs. These members, when glued and securely tied together, may be covered with a bed sheet to increase the lifting power. This covering may be doped with tar for the purpose of water-proofing. It would seem, offhand, that the wing would be a little weak structurally; but, a little later when you attempt to fly your machine, you will find that it is amply strong to withstand the strain, if any, that is placed upon it.

Now comes the tail-group, which like any other group in the community, is organized with the hope that it will hang together. Again, simplicity is the watchword. The vertical rudder has no fixed fin, and consists of an old touring-car door mounted with the hinge in the general direction of the front of the machine. The horizontal stabilizer is stationary—a feature which greatly simplifies the con-

(*Concluded on page* 384)

Big News for P. A. Gas Modelists

Beginning next issue, POPULAR AVIATION will publish drawings and descriptive matter for building a gas driven model of the latest and efficient type. This model has been designed by Paul W. Lindberg, our model editor.

HERE is a big surprise for the gas model enthusiasts who read POPULAR AVIATION. We will begin our drawings and construction data for a beautiful and efficient gas-model in our next issue.

For many months, our readers have deluged us with requests for gas-model plans, but we held back on this project until we felt sure that the proposed model was O. K. in every respect, easy to build, of excellent performance and economical. Our Mr. Lindberg has been working for a long time on this design, and has finally given it his O. K. after discarding several other designs.

It is a scale model of the Rearwin lightplane that is very realistic and true to proportion. Many novel features have been incorporated in the design that add to its performance and ease of handling. As at present constructed, it is powered with a Baby Cyclone engine that is particularly well adapted to this model, although other engines can also be used.

In starting the design, the first ideas in mind were simplicity and low cost of construction. We believe that Mr. Lindberg has achieved both of these objectives and that any model builder can safely attempt the construction of this ship with the assurance that it will fly properly and that the cost will be an absolute minimum for this sort of work. The biggest item of expense, of course, is the engine, but aside from this investment, the cost is not very much greater than the cost of building a large rubber driven scale model.

This is the completed Rearwin gas-model that will be described in forthcoming issues of POPULAR AVIATION. It is a fine looking job that you will be proud to own.

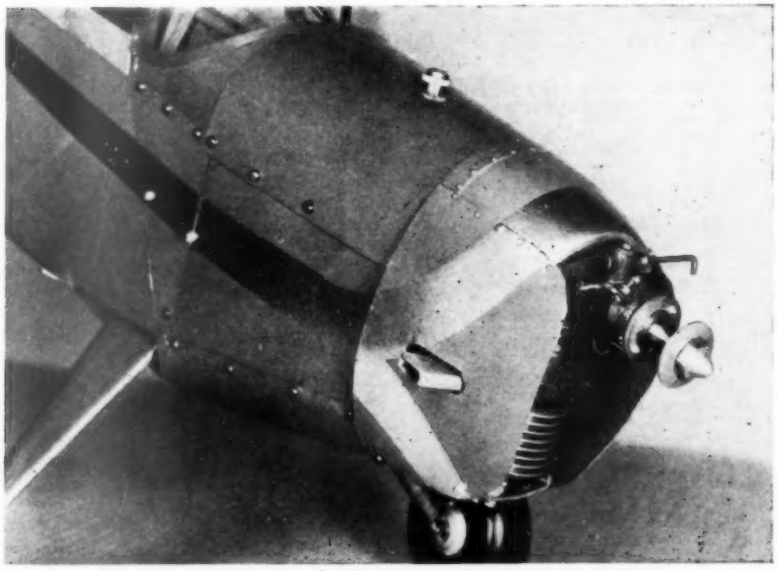
As shown, the motor is inverted and is carried by sheet metal engine bearers that are easy to build, the sheet metal being bent into form and then fastened to the fire-wall. Directly back of the engine is the gasoline tank, the filler cap of which can be seen projecting through the hood. The engine controls are very conveniently mounted, making it a simple matter to start the engine, and to properly adjust the speed without taking the model apart as is sometimes the case with less carefully designed models.

The batteries and spark coil are carried at the rear in the fuselage, where they are easily accessible through a trap-door in the bottom of the fuselage. The batteries and coil, therefore, make it possible to get the proper distribution of weight, when mounted in this way, and it is a simple matter to maintain the proper proportions of the hood for the same reasons. The batteries and coil are built into a self-contained carrier so that they can be removed or replaced as one unit without disturbing a multitude of wiring connections.

Of outstanding interest is the very efficient shock absorber, which is really capable of handling severe landing loads. The model can be dropped from a considerable height on a hard floor without doing the least damage to the ship or the landing gear. This is an important matter in flying a gas model and the problem has been satisfactorily solved in this job.

The cowl, which is generally a difficult job for the gas model builder, as it must be hammered out of sheet metal, is much simplified in this design and yet presents a fine appearance.

And, so, wait for the next issue in which the series of construction articles start. They will be full of interest to everyone, even to those who do not intend to build a model, because the series will be full of flying notes and similar details of general interest.



The nose of the Rearwin gas-model shows an exceedingly neat yet simple cowling and motor-mount. The gas-filler cap is at the center of the hood and all other parts are equally accessible.

What Our Readers Are Building

Amateurs Can Build Planes—Look Below

Sig Syvrud has sent us a photo of a job that looks like a pursuit ship. It is powered with a Szekely engine and flies like a baby pursuit according to the information received from the owner.

It is now getting rather warm, but this little photo of a Canadian snow sled may cool us off on a torrid day. It was built by A. W. Amendola of Cochrane, Ont., and blows along at a mile per minute under favorable circumstances.

This is the fine looking little ship built by W. T. Howell and Victor Lutsky. It has undergone many revisions with an improvement at each revision so that Messrs. Howell and Lutsky should worry, at least not very much.

THIS MONTH we open the ball with a picture and description of a fine little single-seater biplane owned by Sig Syvrud, Box 306, Mandan, N. D., and which was designed and built by Al Schauss, 5448 France Ave., South, Minneapolis, Minn.

It is powered with a Szekeley engine and really goes places, according to its owner. While no accurate performance figures are available, yet the little ship has been checked up with planes of known performance so that the following figures will not be far out of the way.

Top speed.....90 m.p.h.
Cruising speed.....80 m.p.h.
Landing speed.....30-35 m.p.h.
Rate of climb.....800 f.p.m.

It has an excellent visibility range and either landing wheel can be seen from the cockpit, either in flight or on the ground. It has a steerable tail-wheel which makes it handle very easily on the ground. It was landed on the Jamestown (N. D.) airport with a 24 m.p.h. wind blowing and there was no difficulty in taxying wherever the pilot wished to go. The little ship handles very well in a high wind and has been flown for miles at a time with hands off the controls.

The wing span is 18′—0″ and the height is 5′—6″. There is plenty of room in the cockpit and it has all the necessary instruments set in an attractive instrument board. The rudder pedals are adjustable.

Just as one long departing glance at winter, we show the snow-plane built by A. W. Amendola, P. O. Box 54, Cochrane, Ont., which scoots over the snow very nicely at the rate of 50 to 60 m.p.h.

Mr. Amendola, who operates an automobile sales and service garage in his home town, has powered it with a 4-cylinder automobile engine which he does not name. If it had been a Studebaker engine we probably would have been advised of the fact, but as it is he keeps the name dark. A 5′—6″ propeller is mounted on the engine shaft and the power-plant is sufficient to carry three passengers at the speed mentioned. It is supplied with an effective brake for stopping the craft when necessary, a decided improvement over the majority of this type of ice sled.

And now Mr. W. T. Howell, 6008 Lakewood Ave., Detroit, Mich. takes the floor with a plane built by Mr. Victor Lutzky and himself. This nice looking little ship was originally a mid-wing with a Henderson engine but it would not fly thusly. They then made a parasol out of it, installed an Indian engine conversion and flew it several times but it gave trouble by overheating and so it was taken back to the shop for some more revisions.

A Heath B-4 engine was then placed in it and they also put in a

In the Line of Planes and Sleds

And Here We See Some More Amateur Productions

four-foot center-section which increased the span from 25′—0″ to 29′—0″. By thus increasing the wing area they obtained more speed and a quicker take-off and better gliding. They call the attention of the clipped wing enthusiasts to this achievement. The rudder and fin area were also increased at this time so that better control was had, particularly near stalling speed.

Mr. Howell says that the little ship will take off with a 100-foot run when using a 5′—0″ Model 60-B Sensenich propeller, which turns 2,500 r.p.m. on the ground and 2,700 r.p.m. in the air. It cruises at 2,300 r.p.m. and will hold its altitude at 2,100 r.p.m. The top speed is about 75 m.p.h. and it cruises at 60-65 m.p.h.

A photo was enclosed, which did not reproduce well, showing the plane in the first half of a loop. A second picture shows it in a vertical bank. We are sorry that we could not make engravings of these two pictures but they were lacking in detail. The boys say that it is very maneuverable and stable and will fly "hands off."

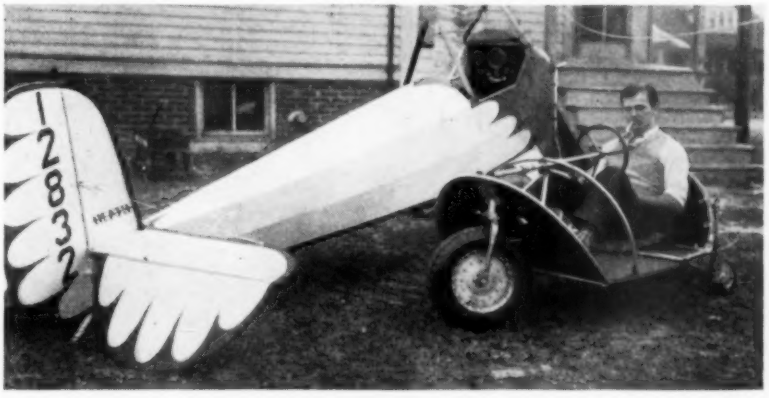
Mr. Howell also built the small car shown in the photo which he says can be built for $100.00, does 35 m.p.h. and does 80 miles to a gallon of gas. It weighs 165 pounds complete and is equipped with a 2-horsepower engine. All this is very interesting and we would like to have some more dope on the car, which truly might be called a "Depression Car."

And now we present a real novelty from Texas, a ground trainer constructed by Amos Jones, Schertz, Texas, with the assistance of his friends. It is a two-seated taxi-dancer with the seats side by side so that the instructor can demonstrate the controls to the student. This is certainly a most attractive little job with all sorts of possibilities of having a good time with it while at the same time, the handling of the controls is safely and quickly learned. To quote Mr. Jones, "the boys sure gang around when we start the activities."

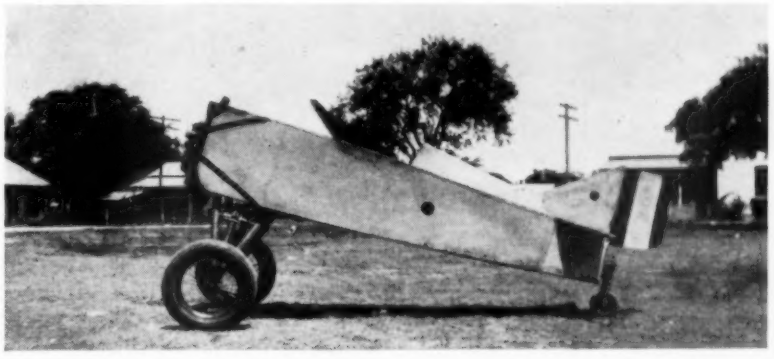
The structure is composite. That is, it is powered with an Indian motorcycle motor and has a landing gear taken from an old Curtiss Hawk. The members of the fuselage are of wood and are covered with tin. Mr. Jones says that he would like to hear from anyone interested in this kind of flying and we are certain that he will draw plenty of letters.

John W. Peterson, 920 Ninth St., Grand Rapids, Mich., now comes to bat with a description of the lightplane he built last year. He had been flying the ship steadily until a few weeks before his letter. A big wind storm blew up and badly damaged the plane, but he expects

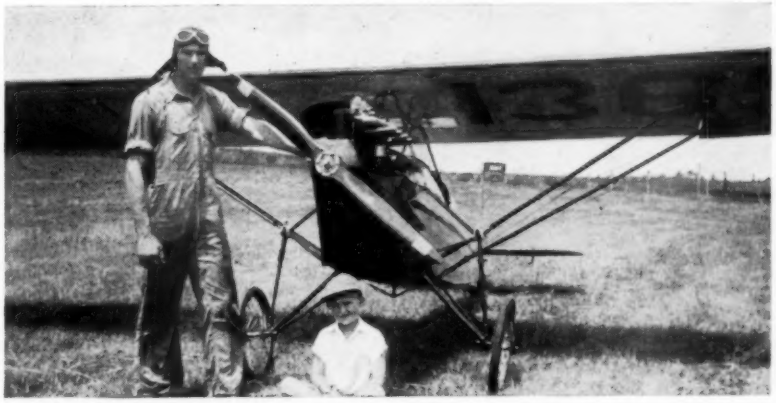
(*Concluded on page* 384)



And here is the Howell-Lutsky plane again in a semi-completed condition. Beside it is the miniature car designed and built by Mr. Howell which is constructed along original lines.



A hedgehopper, penguin or what have you that scoots over the ground and is used as a trainer. It was constructed by Amos Jones who, together with his friends, has had a lot of fun and instruction with the little bus.



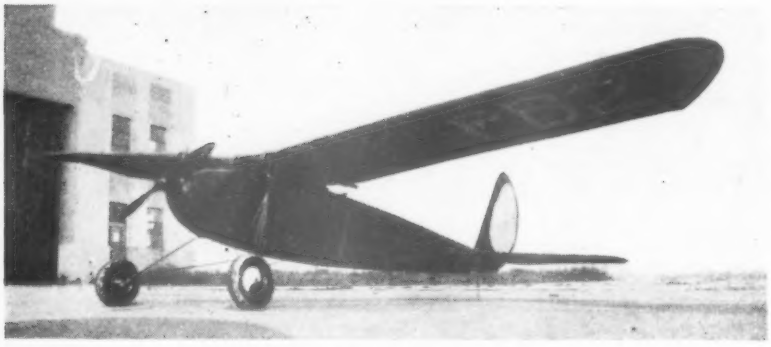
Vernon and Cyril Perschau built this ship which flew perfectly from the start without the necessity of any reconstruction work or re-rigging. It is provided with a Heath-Henderson engine which has given them no trouble.

Gas Driven Model Planes

Some fine examples of gasoline powered airplane models that have been built by our readers.

Arnold Holden and his Blue Eagle super-model.

The take-off of the James Condon, Jr., model.



Thracy Petrides shows a clean-cut job.

The Dykzeul Stinson Reliant gas model.

HOW big is a model? Well, this magazine will not attempt to give a definition because the pictures of big models are coming in so fast that our present guess is that a gas model is anything with a wing-span less than 100 feet.

With this idea of bigness in view, we'll start off with a description of the big baby plane built by Arnold Holden, Bucyrus, N. D., who is shown standing by his model with a full regalia fitted to his manly figure. And fellows, let me introduce you to the "Blue Eagle" which took a year to build and will not fly. The Blue Eagle has just been loaded with gas and is warming up for a foot-race around the pasture.

Close examination discloses the fact that a sort of clap-board construction has been adopted for the sides of the fuselage, a la wood-shed. But, so long as she turns over and makes a lot of noise we should worry. Whoopee.

But now we'll get down to serious matters and discuss a lot of flying gas models that have come to us during the month. The first to appear is the seven-foot Lockheed Vega, a beautiful job, built by the Miniature Aircraft Corp., 83 Low Terrace, New Brighton, N. Y. We thank Mr. K. A. Pouch, the president, for the photograph and description.

This most interesting model has a wing-span of 7'-0" and is propelled by a 1/5-horsepower engine. It has a take-off and landing speed of 15 m.p.h. and will fly one mile on one-quarter ounce of gas. It is equipped with air-wheels and a 19-inch propeller. It is said to be practically crash proof.

James Condon, Jr., sends a picture of his gas model built for the Bamberger Aero Club by Al Kuber and himself about two years ago. It is powered with a Brown Junior engine and was test flown at Newark Airport. It has a span of 7'—0", a chord of 58", and weighs about six pounds.

During one flight at an altitude of about 800 feet, the model began to soar after it ran out of gas, and continued to climb. After soaring for 25-minutes, she came to a graceful landing with no part of the ship touching the ground but the wheels and the skid.

The picture shows the correct method of making tests for the setting of the control surfaces. During the adjustment test, Mr. Condon ran alongside the ship with a 15-foot cord attached to a small knife-switch in the ignition circuit. When the ship left the ground, it could be easily determined whether the controls were set right, and if not, a slight pull on the cord opened the switch and stopped the motor before any damage could be done.

Lester Ohse, Orlando, Fla., sends us this interesting picture of his gas model. It has a span of 7'—6" and a chord of 13-inches. Powered with a

Brown Junior engine, it has been flown successfully. During its test flight, it remained aloft for about two minutes and made a three-point landing in a nearby lake with small damages. It is unfortunate that a more complete description was not given of this model.

Thracy Petrides, 719 West 180th Street, New York, N. Y., has kindly sent us photos of his gas job. This model has a span of 8'—0" and a length of 4'—3". The top speed is approximately 50-m. p. h. and the landing speed is about 17-m. p. h. Up to date, it has made 41 flights and has shown very excellent performance. The photograph shows that it has good looks as well as good performance and what better combination could we ask for?

And now they are getting bigger, for Arthur Marcello, 557 Maple Ave., Barrington, R. I., sends in a picture of his ten-foot model which he says, is an exceptionally fine flyer. It has shock-absorbers, removable landing-gear and tail-surfaces. It has proved to be exceptionally stable in flight and very easy to handle.

And now they are getting smaller, way down to a four-foot span this time. Our next model is that one built by Elbert J. Weathers, 2720 Poinsettia Drive, San Diego, Calif. It is of Mr. Weathers' own design and is powered with an "Elf" engine manufactured in Portland, Ore.

The very small dimensions and weight of this engine make it possible to build small gas-powered models such as the one under discussion. We are glad that these specifications are so complete because it enables us to study the small type of model.

The model is constructed of balsa throughout with Mino tissue covering. The take-off run is 35-foot and the speed at 4,500 engine r.p.m. is about 25-m.p.h. The fuel consumption is 1.8 ounces per hour, which should be well within the range of every pocketbook. The exact rate of climb is not known, but it takes an average of about 4-minutes, 30-seconds, for it to climb nearly out of sight when directly overhead.

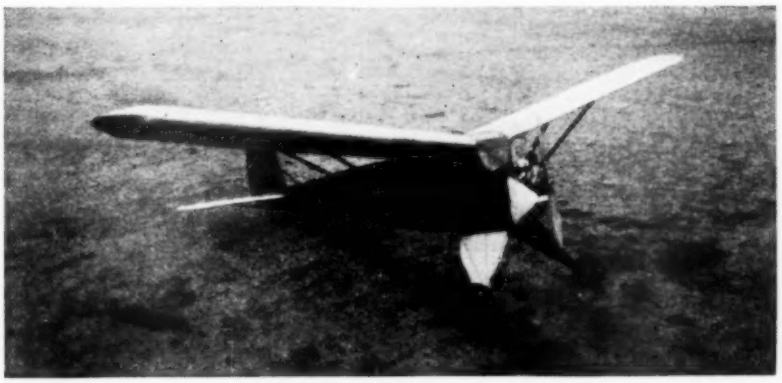
SPECIFICATIONS OF WEATHERS MODEL

Wing-span	4'—0"
Overall length	2'—9½"
Maximum chord	6¾"
Mean chord	5½"
Wing area	252.25 sq. in.
Weight, ready to fly	1-pound, 6-ounces
Wing loading	0.083 oz./sq. in.
Propeller diameter	19½ in.
Propeller pitch	6½"
Dihedral angle	14°
Angle of incidence	0°
Powerplant	Elf-inverted

The Elf engine weighs four ounces. The bore is 0.542" while the stroke is 19/32".

And thus, we conclude this month's collection of gas-powered models. As we are nearing the end of our present collection, with just about enough for one more issue, we will ask you fellows to kindly kick in with the photos and description of your models so that the rest of the gang can see what you are doing.

The Lockheed Vega built by Miniature Aircraft.



Lester Ohse sends this photo from Orlando, Fla.

And Arthur Marcello enters this fine model.

Elbert J. Weathers runs to small sizes with his planes.

AIRLINES and Their Insignia

★

On the Back Cover are shown several more Airline insignia, including those of the leading European Airways.

WEDELL-WILLIAMS AIR SERVICE CORP.

Flying Lockheed "Vegas," Wedell-Williams Air Service operates from Houston to New Orleans along the coast of the Gulf of Mexico. A small but important feeder line, it connects Eastern Air Lines and Chicago and Southern Air Lines with Braniff Airways. The General Offices of the line are located in New Orleans.

GRAND CANYON AIRWAYS

This line is operated only during the summer months when vacation travel is at its peak, offering the air traveler the opportunity of flying direct to the Grand Canyon. Operating tri-motor Ford planes, Grand Canyon Airways connects with TWA at Winslow, Arizona, and flies to the Grand Canyon Airport in the Kaibab National Forest, near the south rim of the Grand Canyon.

COLUMBIA AIRLINES, INC.

Operating from St. Louis to Louisville, Cincinnati, Dayton, Toledo and Detroit, Columbia Airlines connects five air lines with a feeder service which now taps an area hitherto quite difficult of access by air. Tri-motor Stinson planes are used. The General Offices are in Chicago.

STINSON AIR CAB SERVICE

This organization is an association of Stinson dealers who operate charter service in approximately one hundred cities in the United States. Stinson "Reliant" planes are used almost exclusively. The headquarters of the association is located in Wayne, Michigan.

K.L.M. (ROYAL DUTCH AIR LINES)

"K.L.M." is the abbreviation for the full name of the Royal Dutch Air Lines, which is **Koninklijke Luchtvaart Maatschappij voor Nederland en Kolonien N.V.** General Offices are at The Hague. The line is the only company operating in Holland and has been in existence since 1919. Its services extend to England, Belgium, France, Germany, Denmark and Sweden in Europe, and from Holland to the Dutch East Indies. Fokker planes equipped with American Pratt & Whitney engines are used on the European routes and Douglas DC-2's are used on the route to the Orient. The elapsed time from Amsterdam to Batavia has been reduced from 9 days to 5½ days since the DC-2's have been put in operation.

SWISSAIR

The headquarters of Swissair are at Geneva, Switzerland. The company operates a fleet of 4 Douglas DC-2's, 2 Clark GA43, and 2 Lockheed "Orion" planes on routes from Switzerland to France, England, Austria and Germany. It also undertakes special charter work and aerial photography.

INTER-ISLAND AIRWAYS, LTD.

This line is a subsidiary of the Inter-Island Steamship Co., and operates some 400 miles of routes throughout the length of the Hawaiian Islands. Headquarters are in Honolulu. Operations are conducted with Sikorsky S-38 and S-43 amphibians. Incidentally, this line is the most western air line within the territorial limits of the United States.

ILOILO-NEGROS AIR EXPRESS COMPANY

Operating in the Philippine Islands, this line uses tri-motor Fords and employs American pilots. Manila is the location of the General Offices.

DERULUFT

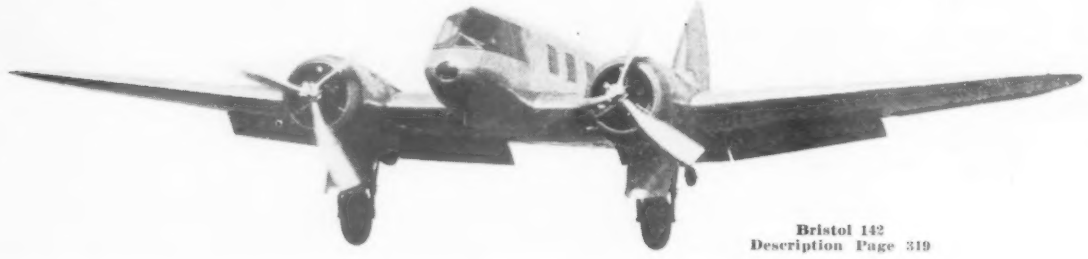
This is a Soviet-German Company operating from Leningrad to Berlin and from Moscow to Berlin. The head offices are located in Berlin and Moscow. Junkers planes are used.

AIR FRANCE

The routes of Air France extend through most of the European countries. In addition, their routes extend to Africa and across the South Atlantic to South America and eastward from Europe to French Indo China. The planes in use on the various routes are: Breguet, Wibault, Potez, Fokker, Latecoere, C.A.M.S., Bleriot and Liore and Olivier. Headquarters are in Paris.

IMPERIAL AIRWAYS

From London, England, the routes of Imperial Airways branch out to most European countries and extend down the entire length of Africa and eastward to Singapore. Planes now in use are: Handley-Page, Short, De Havilland, Armstrong, Whitworth, Avro and Boulton & Paul. Headquarters are at London.



Bristol 142
Description Page 319

AIR TRANSPORTATION IN THE UNITED STATES

(SEE MAP ON BACK COVER)

LEGEND

1. Aerovias Centrales, S. A.
2. American Airlines, Inc.
3. Boston-Maine Airways, Inc.
   Central Vermont Airways, Inc.
4. Braniff Airways, Inc.
5. Canadian Airways, Ltd.
6. Central Airlines, Inc.
7. Chicago and Southern Air Lines.
8. Delta Air Lines.
9. Eastern Air Lines.
10. Hanford Airlines, Inc.
11. National Airlines System.
12. National Parks Airways, Inc.
13. Northwest Airlines, Inc.
14. Pan American Airways, Inc.
15. Pennsylvania Airlines and Transport Co.
16. Transcontinental & Western Air, Inc.
17. United Air Lines.
18. Varney Air Transport, Inc.
19. Wedell-Williams Air Service Corp.
20. Western Air Express Corporation.
21. Wilmington-Catalina Airline, Ltd.
22. Wyoming Air Service, Inc.
23. Compania Nacional Cubana de Aviacion.

AIR transportation companies of the United States cooperating with the Department of Commerce have laid down a network of more than 28,000 miles of airways. This vast system, reaching to the far corners of the United States, is for the most part lighted, and equipped with radio range beacons, intermediate landing-fields, weather stations and airports.

During 1935, 746,946 passengers traveled on our scheduled airlines, making average flights of 420.20 miles each. The average fare paid was 5.7 cents-per-mile. Passenger traffic increased 61 per cent over the year 1934.

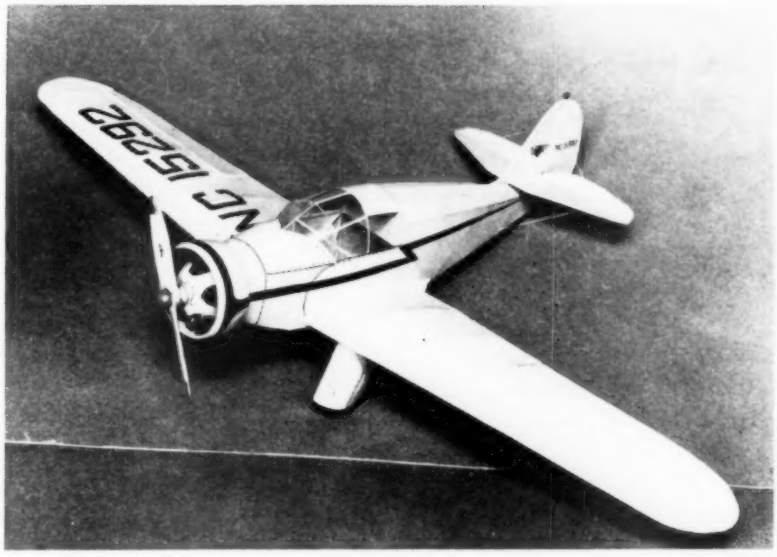
The 23 operating companies flew a total of 55,380,353 miles. Passenger-miles summed up to 313,905,508. Express almost doubled its previous figures, there being 3,822,397 pounds carried in 1935 for a total of 2,179,604,285 express-pound-miles.

There were 459 transport planes in operation on scheduled airlines at the end of 1935 and they consumed 33,260,609 gallons of gasoline and 879,775 gallons of oil during the year. Airline employees totaled 8,333 persons at the end of 1935 classified as follows: 652 pilots, 335 co-pilots, 2,613 mechanics and ground-crew men, 1,515 other hangar and field personnel, 3,006 operations and office personnel and 212 hostesses. The domestic lines started 90,124 flights during the year and completed 85,063, or 94.38 per cent of those flights on scheduled time.

In addition to the commercial value and importance of our airways, their significance to our problem of national defense is obvious. Think of what it means to the swift movement of military aviation, troops and supplies, to have completely equipped airways serving the entire nation. Adequate fields and servicing facilities are at hand within every one or two hours flying time. Any part of our air force can be transferred to the point of need within a few brief hours.

Building the New Aeronca

by PAUL W. LINDBERG
Model Editor and Model Designer for
POPULAR AVIATION



When you compare this completed model of the new Aeronca with the colored reproduction on the cover, you will realize its lifelike appearance.

THIS low-wing monoplane is an excellent flyer, and is also a complete change from the old type Aeronca. The model is very simple to construct because of its clean lines. It is equipped with shock absorbing landing gear together with movable controls which carry aluminum hinges.

COLOR SCHEME

Entire ship—Loening yellow.
Trim in black.

CONSTRUCTION OF FUSELAGE

It is necessary to place a sheet of ordinary wax paper over the plan to prevent cement from sticking to the plan. In building the fuselage, construct one side at a time. The longerons, vertical and diagonal braces, etc., are held in place until securely cemented, by inserting straight pins on either side of strips.

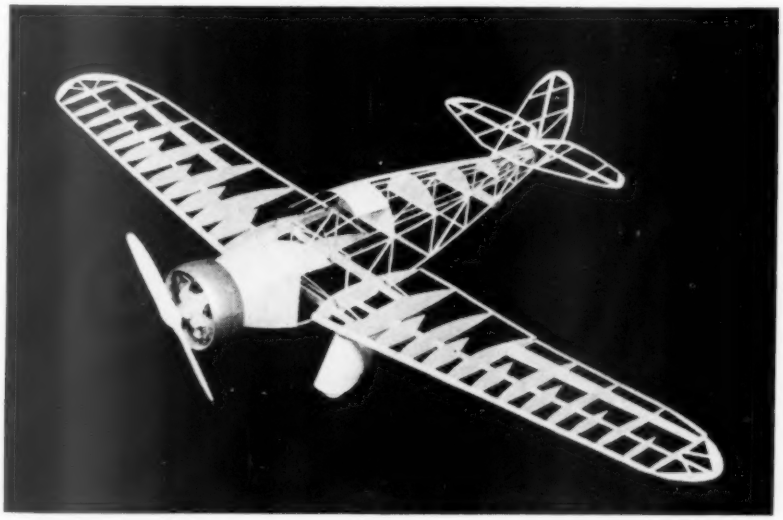
After the two fuselage sides are completed, they are pinned to top view of the plan, in such a manner that the top longerons face down and the sides are at right angles with the table. The cross-members are now cemented in place, forming a rectangular fuselage. Cut formers from 1/32-inch sheet balsa and cement in their respective positions as shown on plan. Balsa nose plate is built up from ⅛-inch sheet balsa.

CONSTRUCTION OF MOTOR

The cylinders are carved and sanded from balsa blocks. When 5 cylinders have been formed, wind heavy thread around them to represent fins. Make crankcase from two pieces of balsa. Rocker arm housings, push rods and other small details of motor are made of balsa.

CONSTRUCTION OF WING

Cut all ribs from 1/16-inch balsa. Pin the spar in position on the plan. Now, cement ribs in their proper locations. The leading and trailing edges are cut and sanded to shape and cemented to the ribs. The panels carry movable ailerons which are a great help in controlling the flights. Make wing tips from 1/16-inch thick balsa. We highly approve of this type of wing tip, because it is much easier to construct and neater in appearance.



The uncovered frame of the Aeronca Cabin plane.

CONSTRUCTION OF ELEVATOR AND RUDDER

These are built from 1/16-inch square and flat balsa, and are constructed on the plan. Their construction is very simple, therefore, no difficulty should be encountered here.

CONSTRUCTION OF LANDING GEAR

The construction of landing gear is clearly shown on plan.

COVERING THE MODEL

Apply tissue to the various framework members, using a light grade model airplane dope to fasten it to the outer edges. Stretch tissue as tightly as possible to remove all wrinkles. When edges have dried, apply coat of water to tissue. When all water has dried completely, tissue will become taut. May we suggest that you pin wings, elevator and such to flat surface. This prevents warping.

ASSEMBLY

After the wing panels have been cemented to fuselage, make fillets from paper and fill in open spaces between fuselage and wing panels at trailing edges.

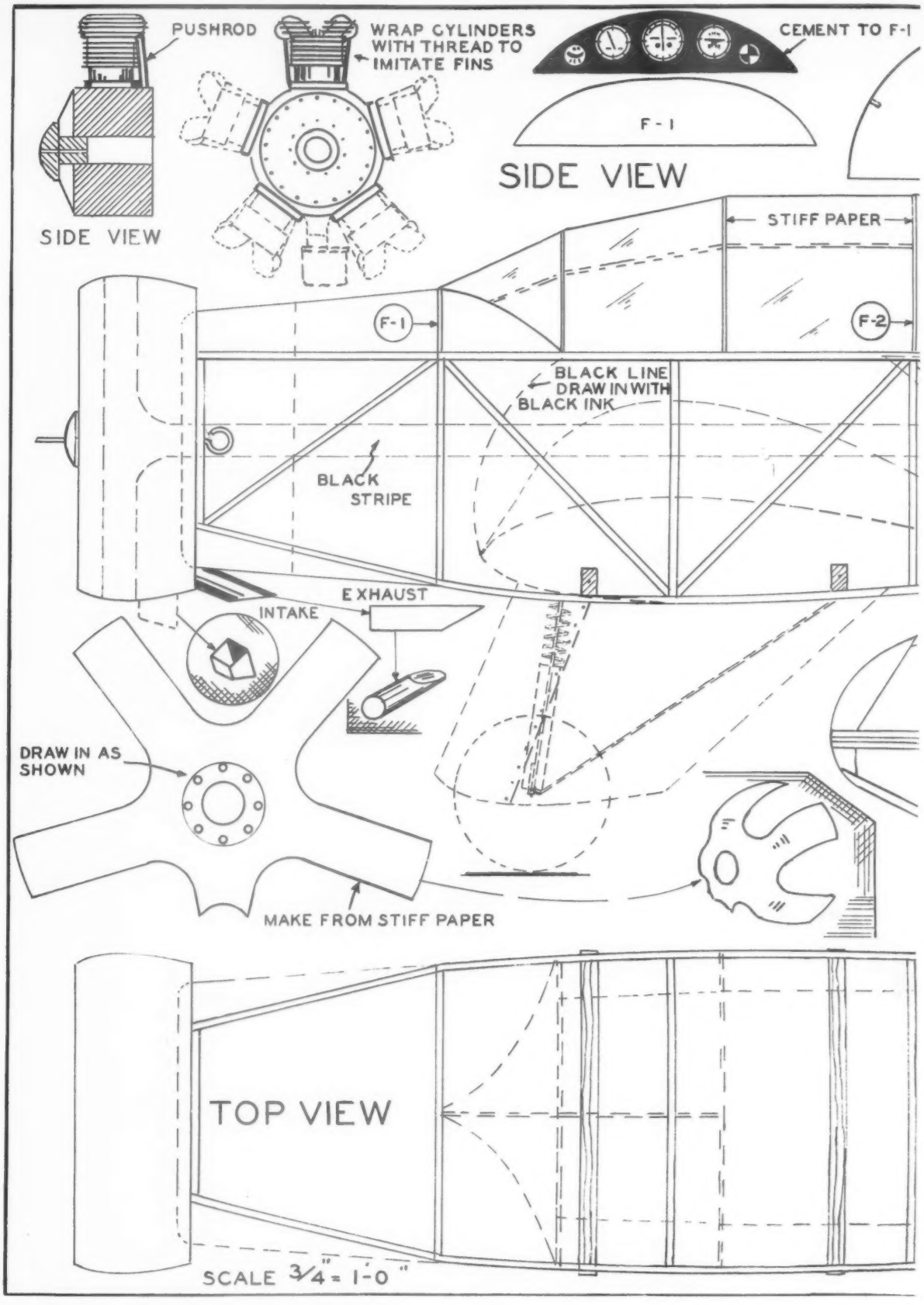
Other small details are clearly shown on plan.

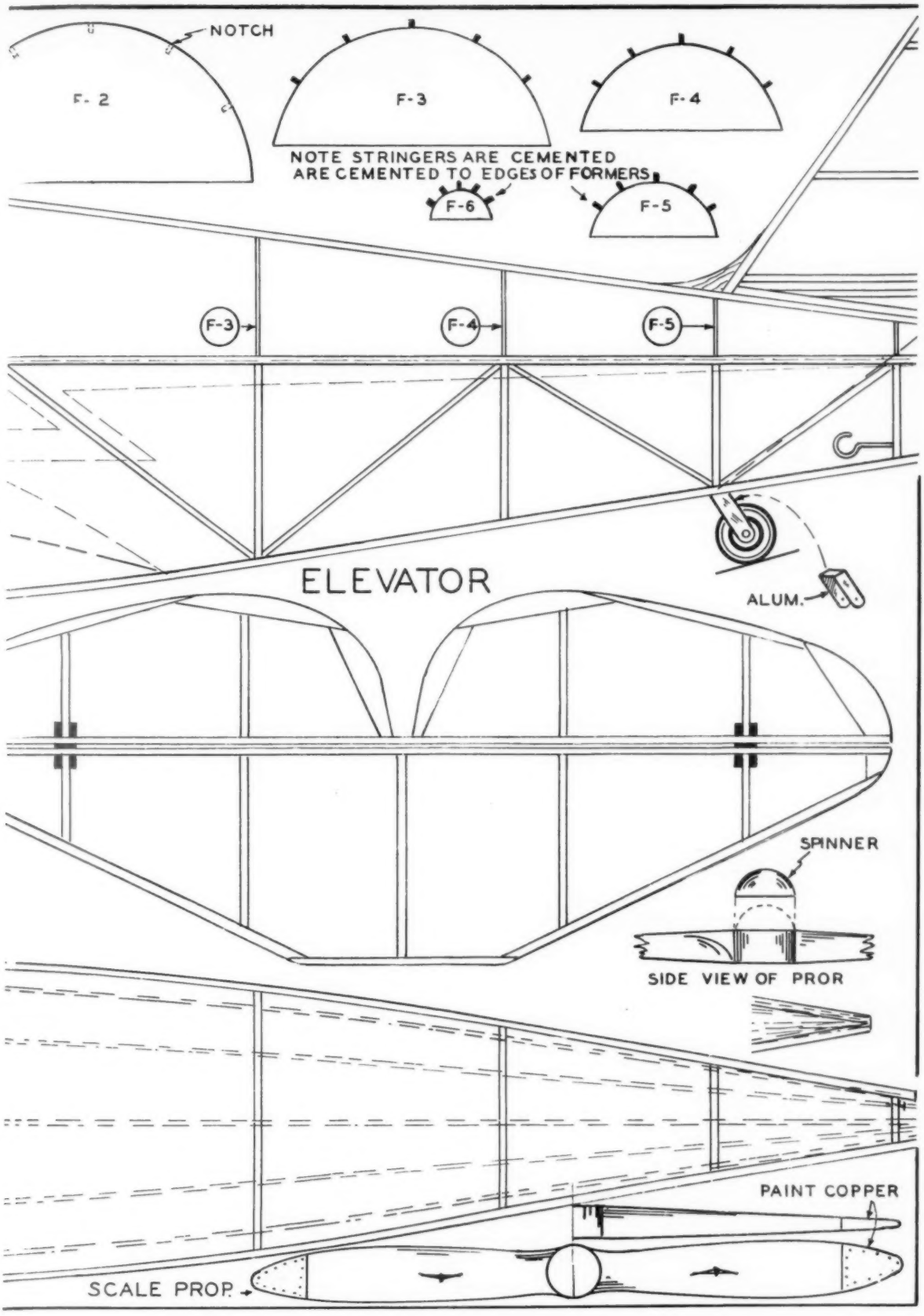
TESTING AND FLYING

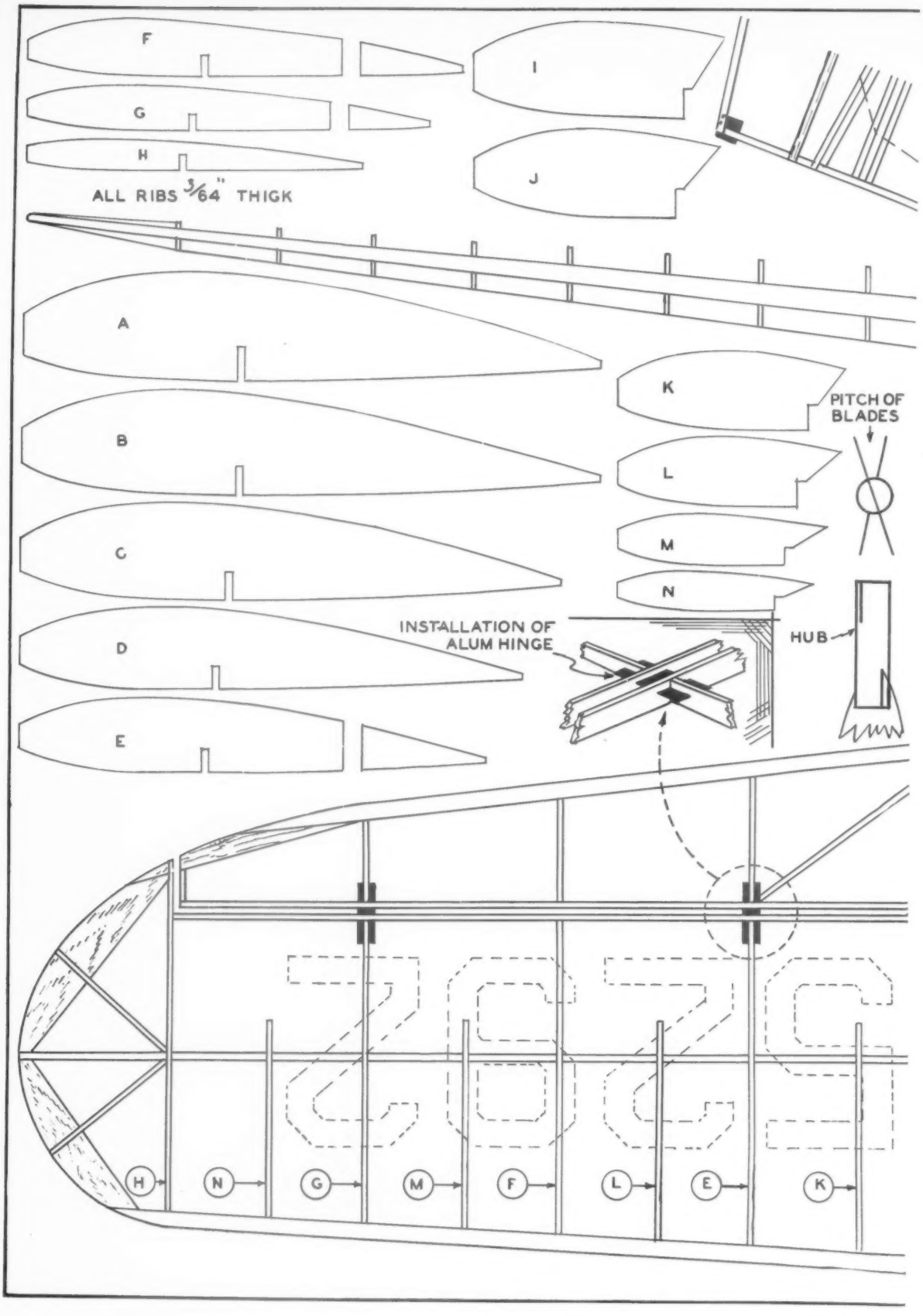
Two types of propellers are used on this model. One, which has a wide blade, is made of fiber. This type of blade causes the motor to turn at less r.p.m. and greater flights result. By twisting the blades, the pitch can easily be adjusted. The balsa scale propeller is used for exhibition purposes only. Six strands of one-eighth flat rubber are sufficient to fly the model.

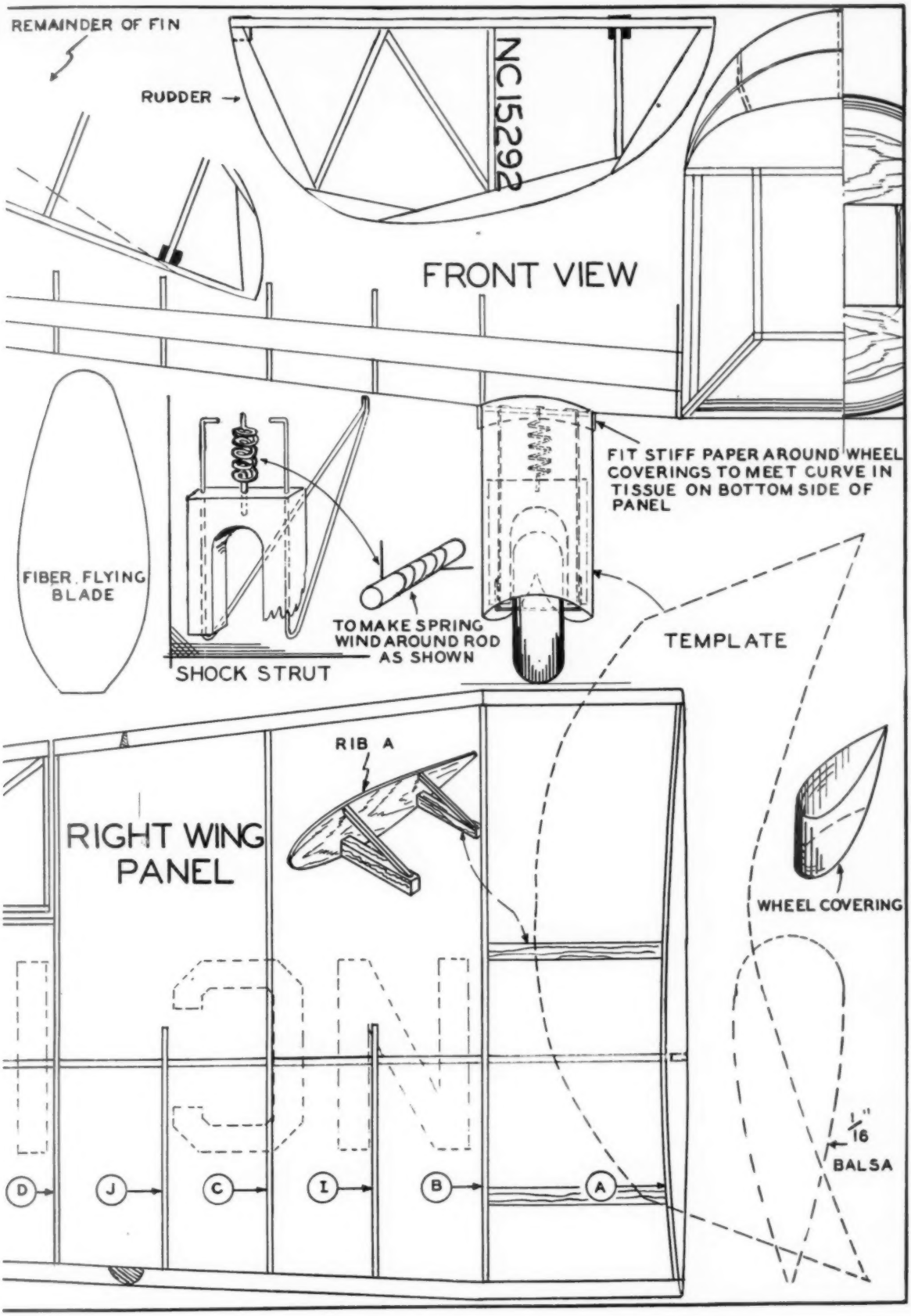
With the rubber motor and flying propeller in place, gently launch your model over tall grass. By this method, you can see if your model is properly balanced.

XUM


PUSHROD
WRAP CYLINDERS WITH THREAD TO IMITATE FINS
CEMENT TO F-1
F-1
SIDE VIEW
SIDE VIEW
STIFF PAPER
F-1
F-2
BLACK LINE DRAW IN WITH BLACK INK
BLACK STRIPE
EXHAUST
INTAKE
DRAW IN AS SHOWN
MAKE FROM STIFF PAPER
TOP VIEW
SCALE 3/4" = 1-0"


NOTCH
F-2
F-3
F-4
NOTE STRINGERS ARE CEMENTED
ARE CEMENTED TO EDGES OF FORMERS
F-6
F-5
F-3
F-4
F-5
ELEVATOR
ALUM.
SPINNER
SIDE VIEW OF PROR
PAINT COPPER
SCALE PROP


F
G
H
ALL RIBS 3/64" THIGK
I
J
A
B
C
D
E
K
L
M
N
PITCH OF BLADES
INSTALLATION OF ALUM HINGE
HUB
H
N
G
M
F
L
E
K


REMAINDER OF FIN
RUDDER
NC15292
FRONT VIEW
FIBER FLYING BLADE
SHOCK STRUT
TO MAKE SPRING WIND AROUND ROD AS SHOWN
FIT STIFF PAPER AROUND WHEEL COVERINGS TO MEET CURVE IN TISSUE ON BOTTOM SIDE OF PANEL
TEMPLATE
RIB A
RIGHT WING PANEL
WHEEL COVERING
1/16 BALSA
D
J
C
I
B
A

Oil For Baby Cyclones

WE have just received word from Aircraft Industries, makers of the Baby Cyclone model gas engine, that they have made exhaustive tests on various types of lubricating oils and find that their engine functions best on Valvoline SAE 70 oil. They recommend that owners of the Baby Cyclone use this oil exclusively until further notice.

This announcement is of more than passing interest because both the life and performance of any engine, large or small, depends almost entirely upon the suitability of the oil used. If the oil is too viscous, then there is an unnecessary loss of power due to the fluid friction of the oil. If the oil is too thin, it does not stay put and there is not only an excessive loss of oil but the oil does very little good.

Answers to Cross-Word Puzzle

HERE are the correct and official answers to the airplane cross-word puzzle published in the April issue of POPULAR AVIATION. We hope you win.

Horizontal Lines		Vertical Lines	
1.	stagger	1.	speed
2.	elevator	3.	axel
4.	washout	5.	gear
7.	plywood	6.	stall
9.	earth	8.	steer
11.	license	10.	oil
14.	roll	12.	inflow
16.	preignition	13.	torque
17.	aerostat	15.	biplane
20.	strut	18.	earth
22.	jacket	19.	gust
23.	lug	21.	nut
25.	gap	22.	jet
26.	gears	24.	can
28.	TWA	25.	goggles
		27.	Pratt
		29.	spar

The Gas-Powered Model in the Movies

by JESS LAUGHLIN

The gas-powered movie model devised by Reginald Denny for use in special movie work and for instructional purposes in schools.

REGINALD DENNY, well known movie star, may well be proud of the gas-powered model plane his company is producing in Hollywood. Following faithfully the design of the Fairchild 24 cabin plane, this sturdily constructed model looks and flies like its well-known prototype.

Model builders will be interested to know that an increasing number of these planes are being used by the motion picture companies for "process shots," in flying pictures, for realistic crackup effects and in actual flight to simulate the larger ships where close-up shots are not required.

One of the reasons for the popularity of this model with the studios is that they not only fly realistically, but the sound effects of the gas engine may be recorded on the "sound track" of the film at the same time the picture is being made. Previously, where scale models were used in these miniature "shots" in flying pictures, sound was "dubbed in" (sound recorded separately) after the picture was completed for that scene.

Another novel use to which this model is being put is its use by a well known flying school in Southern California for instruction in aerodynamics, airplane construction, and theory of flight. This school has each of its students buy a kit of this model, construct it and then put in a number of "hours" studying the flight of the completed plane.

Practically crack-up proof, this model has a top speed of 50 mph. and a landing speed of 20 mph. An automatic timer is used to cut off the engine at any predetermined time so that flights may be regulated regardless of the amount of fuel carried.

The typically high vertical fin (with rudder an integral part) acts as a vane when the engine is cut off, forcing the plane to turn into the wind. Thus, a perfect landing into the wind is assured. Both the vertical fin and the stabilizer are adjustable, the latter by a small crank on the underside of the fuselage just in front of the tail wheel.

The engine, a Brown, Jr., is offset two degrees to counteract torque. It is separated from the other parts of the ship with firewalls. All stress and load members have a 10-1 safety factor.

A feature, quite novel in a model, is that of having shear pins at the points where the spars of the wings are secured to the fuselage. In case of a ground loop these pins will shear off, leaving the wing undamaged.

Bass wood, spruce, and dural are the principal materials used in its construction. Balsa wood is used where strength is not needed. Some of the metal struts are streamlined with balsa, thus combining strength with lightness.

Because this company is developing a radio controlled gas-engined model, they have found a different type of gas engine will be needed, and are doing the necessary work at present.

END.

WHOLESALE PRICE LIST NO ORDERS ACCEPTED FOR LESS THAN $2.50

For Dealers, Clubs and Schools Only — *Prompt Service—the Kind That Satisfies*

All Orders Sent Express Charges Collect — **No C. O. D.'s, No Stamps.** — **Send for Complete Price List.**

Quantities will not be broken to less than ½ listed lots.

FREE 1/2 PINT CLEAR CEMENT WITH EVERY ORDER **FREE**

BALSA 36" LENGTHS PER 100
1/32x1/16 .....10c
1/16x1/16 .....10c
1/16x3/32 .....18c
1/16x1/8 .....19c
1/16x3/16 .....24c
1/16x1/4 .....26c
1/16x1/2 .....60c
3/32x3/32 .....24c
1/8x1/8 .....29c
1/8x3/16 .....48c
1/8x1/4 .....52c
3/16x3/16 .....65c
1/4x1/4 .....80c
1/4x1/2 .....$1.50
1/2x1/2 ..... 2.15
1x1 ea. 6c 1x1½ ea. 11c
½x2 ea. 8c 1x2 ea. 13c
2x2 ea. 23c 2x3 ea. 32c
36" SHEETS.
1/64x2 ....10 for 18c
1/32x2 ....10 for 14c
1/16x2 ....10 for 17c
3/32x2 ....10 for 20c
1/8x2 ....10 for 22c
3/16x2 ....10 for 31c
1/4x2 ....10 for 40c
SHEETS 3" WIDE
Double these prices.
PROP. BLOCKS PER DOZEN
½x¾x5.5c ½x¾x6.5c
½x1x7 14c ⅝x1x8 17c
¾x1¼x10 .....29c
¾x1¼x12 .....34c
1x1½x12 .....38c
1x1½x15 .....52c
HIGH GLOSS DOPE
2 oz. bot., doz. $1.25

WIRE, PER 100 FT.
No. 6 .20c No. 8 .23c
No. 10 .25c No. 12 .30c
No. 14 .....35c
BALSA BALLOON WHEELS
½" dz. 9c ¾" dz. 11c
1" dz. 14c 1½" dz. 19c
1½" dz. 35c 3" dz. 75c
BIRCH WHEELS LIGHT and STRONG
½" dz. .5c ¾" dz. .6c
1" dz. .8c 1½" dz. 10c
1⅞" .....dz. 15c
NOSE BLOCKS, PER DOZ.
1x2x1 ..6c 2x2x1 .12c
3x3x1 .20c 3x3x2 .39c
REED
1/32 dia. ..50 ft. 15c
1/16 dia. ..50 ft. 18c
3/32 dia. ..50 ft. 20c
DOWELS
1/16x6" ....Gross 40c
1/8x36" 100 for $1.50
RUBBER THREAD BEST QUALITY FRESH
.045 sq. 225 skeins 38c
1/16 sq. 225 skeins 40c
1/8 flat 225 skeins 45c

Per POUND.
1/16 or 1/8.....$1.05
SANDPAPER
12 pkgs. 25c
INSIGNIA SHEET —24 AND STRIPES
1 Sheet..5c Doz..38c
50 ...$1.25 100 .$1.75
1000 Sheets ...$15.00
BEST BAMBOO
1/16x1/4x15 doz..8c
1/16x1/16x12 gross 15c
WOOD VEN. PAPER
20x30 .....each 7c
½" NOSE PLUGS, HARDWOOD
1 doz...5c 100 ...40c
1000 ...$3.50
THINNER
1 oz. dz. 44c 2 oz. dz. 75c
½ pt...25c 1 pt...40c
1 quart.....65c
½ gal. 90c 1 gal. $1.50
PROP. SHAFTS
1 gross 45c
CLEAR CEMENT, DRIES QUICKLY. BEST QUALITY
1 oz. bottle ..doz. 45c
2 oz. bottle ..doz. 80c
2 oz. tubes..doz. $1.00

⅛ pint 30c 1 pint 45c
1 qt. 75c ½ gal. $1.25
1 gal. $1.75 5 gal. $7.50
CLEAR DOPE
1 oz. bottle ..doz. 44c
2 oz. bottle ..doz. 80c
½ pt...25c 1 pt...40c
1 qt..65c ½ gal..90c
1 gal. ....each $1.50
COLORED DOPE
Red, White, Blue, Black, Orange, Silver, Yellow, Olive Drab, Cream, Gray, Khaki.
1 oz. bottle..doz. 50c
2 oz. bottle..doz. 90c
½ pt..35c 1 pt. 50c
1 qt. 85c ½ gal. $1.35
1 gal. $2.25
TISSUE "AA" 20x24
1 doz. white.....11c
1 doz. colored....14c
SILVER TISSUE 20x24....per doz. 21c
WASHERS, PER 100
⅛ O.D. & ¼ O.D. 5c
BRASS EYELETS
1/16 I. D. 100 ..15c
MECHANICAL WATER SPRAYERS, doz., $1.00

SHEET ALUMINUM 12" WIDE
.003 .....5 ft. for 50c
.010 .....5 ft. for 75c
.0003 thick 3½ wide..25 ft. for 12c
ALUM. TUBING
1/16 .....2 ft. 30c
⅛ .....5 ft. 32c
MODEL PINS
½" or 1" .12 pkgs. 35c
MACHINE CUT PROPS, per dozen
5" .22c 6" .25c 7" .33c
8" .38c 10" .48c 12" .58c
THREE-VIEW 20" FLYING PLANS
Goshawk, Fokker D VII, Boeing 247, S. E. 5, S-P-A-D, Vought Corsair, Gee-Bee, Douglas Amph., Waco Cabin, Boeing P12 F., Sparrow Hawk. 10c each
12 assorted 75c
50 assorted ...$2.50
100 assorted 4.50
THRUST BEARINGS, per dozen
Small...8c Large..10c
CELLULOID WHEELS, per dozen
¾" 24c 1" 25c 1¼" 35c
1½" ..60c 3" ...$1.50
SHEET CELLULOID
12½x16 ....each 15c
6x8 .....doz. 45c
½" to 1" Celluloid Pants ..doz. $0.80
1¼" to 1⅞" Celluloid Pants doz. $1.00

RELIABLE DEALERS SUPPLY
416 Gravesend Ave., BROOKLYN, N. Y.

SELLEY-TEX GIVES MORE FOR YOUR MONEY!

U. S. Pat. App. For

Thousands now succeed who failed to build All-Balsa-Stick-Kits!

SELLEY repeats Full-Money-Back-Guarantee

BY POPULAR ACCLAIM!

PLUS POSTAGE

IF YOU DO NOT JUDGE THE SELLEY-TEX CONSTRUCTION SET YOU BUY TO BE THE EASIEST, SIMPLEST AND MOST PRACTICAL WAY TO BUILD A FLYING MODEL PLANE YOU EVER TRIED, JUST RETURN IT TO US AS RECEIVED AND WE WILL GLADLY REFUND THE FULL PURCHASE PRICE PLUS POSTAGE IMMEDIATELY AND WITHOUT QUESTION.

(Signed)
SELLEY MANUFACTURING COMPANY, INC.
BROOKLYN, NEW YORK, N. Y.

NOT ONE KIT RETURNED OR ONE COMPLAINT MADE

since announcement of this "Money-Back-Guarantee" offer!

Thanks to the tremendous response received from this "Full-Money-Back-Guarantee," we again make this offer to "UNSUCCESSFUL" model builders. We urge everyone whoever "failed" to build an All-Balsa-Stick-Kit to avail themselves of this opportunity to prove to themselves that SELLEY-TEX "moulded" construction is the greatest "practical" advance in the history of model airplane kits. There is no need to take our word for it. We prefer to let those who have tried this revolutionary, simplified building method tell of their own experiences with SELLEY-TEX. The excerpts from letters on file in our office, shown on this page, speak volumes about the ease of assembly and excellence of performance now achieved by novices as well as experts. No matter which of the "star" model SELLEY-TEX construction sets you choose, we definitely promise that you, too, can enjoy the same satisfying results. Try SELLEY-TEX and get an entirely new thrill in model building and flying! When you contrast this Modern Method of Model Building with "old-fashioned" All-Balsa-Stick-Kits you will see why so many are agreeing that SELLEY-TEX is the "STAR" BUY! Read the coupon below and ACT NOW!

"I just finished building your Monocoupe and want to say it has exceeded my greatest expectations. I'll never go back to the all wooden kits again."

1.25 15c Postage

Wing Span, 20"
Length ....12½"

MONOCOUPE

A beautiful miniature of the popular original and what a flyer!

"I had a lot of fun building the Vought Corsair Jr. model and made a profit, too. I sold the finished job to a friend for $3.75. SELLEY-TEX kits for me from now on!"

1.25 15c Postage

Wing Span...18"
Length ....13¾"

VOUGHT CORSAIR, JR.

This latest formidable looking military plane complete with guns, bombs, etc., is built for stamina and designed for speed.

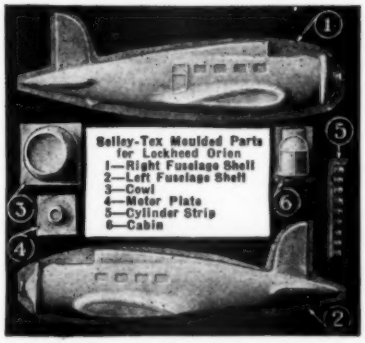
"After my friends showed me the easy SELLEY-TEX method of building the difficult parts of a model, I decided to discard the old way and have built your Lockheed Orion for our annual Hobby Show."

Wing Span...20"
Length ....12¾"

1.25 15c Postage

LOCKHEED ORION

An amazing realistic replica of this famous transport.



Each of the SELLEY-TEX Construction Sets contain the necessary individually designed moulded scale parts similar to those shown above.

"The Rearwin Sport kit I constructed looks like a prize contest winner to me. I think SELLEY-TEX is the greatest bargain ever offered on the market."

75c 15c Postage

Wing Span..16"
Length .....10"

REARWIN SPORT

Simple to build and realistic in all details! A great flyer too! Wonderful Value!

"I didn't think it believable that I could actually build and fly a model plane until I tried the Bellanca Swoop. Especially after many failures with all wood kits."

1.00 15c Postage

Wing Span, 20"
Length ....11⅛"

BELLANCA SWOOP

A perfect authentic reproduction of this famous London to Melbourne racer.

HERE'S PROOF

THAT SELLEY-TEX OFFERS MORE than All-Balsa-Stick-Kits!

★ **MOULDED CONSTRUCTION.** First real advancement in practical model airplane building. The production investment exceeds the costs of most of the All-Balsa-Stick Kit manufacturers combined!

★ **EXCLUSIVE FABRIC.** Specially close woven and processed by secret formula. The smooth moulded surface can be beautifully finished in any color combinations with dope or lacquer.

★ **EASIER-TO-BUILD.** The moulded parts make it simple as A B C. Novices as well as experts easily and successfully build and fly planes this new simple way.

★ **MORE PRACTICAL.** Selley is discontinuing All-Balsa-Stick type of kit entirely. An analysis showed that less than 2% of those who try, can actually complete an All-Balsa-Stick Kit!

★ **MORE AUTHENTICALLY DESIGNED.** Many details are moulded into model. Each is an exact to-scale miniature of the original plane shown in every detail.

★ **MORE DURABLE.** The moulded fabric cells are stronger though lighter. They will not wear or puncture and are practically crash-proof and unbreakable.

★ **BETTER FLYERS.** The moulded fuselage eliminates weight behind center of gravity which is approximately 95% perfect in all models assuring better flying performance.

★ **POSITIVE MEANS of BALANCING.** Simple ring device correctly balances plane. A new clever feature found only in these moulded models.

★ **PATENT APPLIED FOR.** The moulded process is an original creation owned exclusively by Selley.

★ **MONEY-BACK GUARANTEE.** A full protection money back guarantee certificate is included in every kit!

"My easy success with your Curtiss Osprey leads me to strongly recommend the clever moulded method of construction and hope that others who have not tried SELLEY-TEX, will do so. They're in for a pleasant surprise!"

CURTISS OSPREY

1.25 15c Postage

Wing Span 18¼"
Length ....13½"

Exceptional flight performance, authentic beyond belief. Full military equipment, guns, bombs, etc., for realism.

PARTS AND ACCESSORIES

Every model is packed in a beautiful, sturdy box with semi-finished flying or scale propeller, formed wire hooks, sealed wheels, with brass bushings, ribs printed out accurately on white sheet balsa, many special turned wood parts, finest grade of balsa wood sticks, tail wheel and fork fittings, and wire, pure para rubber, colored paper, authentic markings, colored insignia, best quality cement, colored dopes, full-size easy-to-understand plan.

Dealers! Jobbers! Sales Representatives!

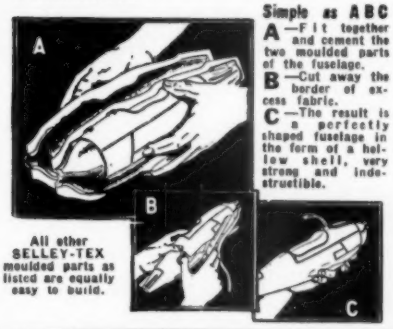
Wide awake merchants will appreciate the tremendous sales appeal of these new competitively lower priced SELLEY-TEX kits. CASH IN on these exclusive sell-on-sight sensations. Write today for complete information, discounts, etc.

Simple as A B C

A—Fit together and cement the two moulded parts of the fuselage.

B—Cut away the border of excess fabric.

C—The result is a perfectly shaped fuselage in the form of a hollow shell, very strong and indestructible.



All other SELLEY-TEX moulded parts as listed are equally easy to build.

FREE! Just off the press! Write for our new beautiful, two-colored broadside illustrating in detail the new line of incomparable lower price SELLEY-TEX Construction Sets. Send 3c stamp for postage.

A brand new supply catalogue picturing and listing the most popular plane accessories is yours for the asking. Send 3c for postage.

Try your leading Dept. store or local dealer first. Use coupon if you can't get SELLEY-TEX. Please mention your dealer's name and address.

Please send me the SELLEY-TEX model kits I have checked. I am enclosing $..... (check or money order). (Each plane 15c postage. West of Denver 25c postage.)

MONOCOUPE	$1.25 ☐	REARWIN	$ .75 ☐
VOUGHT CORSAIR	1.25 ☐	BELLANCA SWOOP	1.00 ☐
LOCKHEED ORION	1.25 ☐	CURTISS OSPREY	1.25 ☐

PRINT NAME .....

ADDRESS .....

CITY AND STATE .....

DEALER'S NAME .....

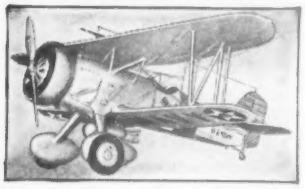
SELLEY MFG CO. INC., DEPT 405 B 1373 GATES AVENUE, BROOKLYN, N. Y.

Build your next Model 100% True Scale

Build one of these beautiful IDEAL "Super Detail" Flying Models; each one accurately designed by flying men, with cockpit operated controls and other exclusive features. Pick from the list below. Ask your dealer or send the coupon . . .

SuperDetail Flying Models

BOEING P-26-A Wingspan 21¼ in., Length 18 in., Weight 2½ oz., Scale ¾ in.; beautifully colored olive drab and yellow. Complete Kit.....$1.75



CURTISS GOSHAWK

Wingspan 23⅜ in., length 16¾ in., weight 3⅜ oz., exact ¾ in. scale. Coated with new IDEAL high lustre finish, with silver, yellow, red and black coloring. Kit complete, postpaid $2.00

RYAN ST—Wingspan 22½ in., Length 16½ in., Weight 2⅛ oz., Scale ¾ in.; with dual control system operated in either cockpit; adjustable wing flaps; and plans for making an engine with 4 cylinders, carburetor, spark plugs, etc. Complete Kit $1.50

STINSON RELIANT—Wingspan 32⅝ in., Length 21¼ in., Weight 3½ oz., Scale ¾ in. Complete Kit....$2.50

MARTIN BOMBER—Wingspan 35 in., Length 22½ in., Weight 4⅝ oz., Scale exact. Complete Kit.....$3.50

Try this New IDEAL Tru-Cut Nife

Razor-edge blade securely fastened in a long, easy-grip handle. Cuts balsa like butter; follows intricate curves easily. Fine for any cutting purpose. Get one! **Postpaid for 15c each; extra blades, 3 for 10c.**

Build a Model of the S. S. NORMANDIE

An accurate, realistic reproduction of the Trans-Atlantic Record Holder. 32½ in. long. Shaped hull—over 100 metal fittings—1000 portholes—60 metal davits—30 life boats—16 winches—24 cast metal stairways—complete with all wood and fibre parts—high lustre colors—full size Plans and Instructions. **Postpaid for $7.00.**

Illustrated Catalog—Bulletins

Beautifully illustrated Bulletins of Model Ships and Airplanes, with Lists of Boat and Airplane Parts, Supplies and Materials—all for only 5c.

Pacific Coast Branch:
Model Boat & Aircraft Co.,
1356 5th Ave., San Diego, Calif.

IDEAL AEROPLANE & SUPPLY CO., INC.

22-26 W. 19th St., New York City.

Please send the items I have checked. I am enclosing $..... (West of Denver 25c extra. All planes postpaid.) Canadian Prices 40% higher to cover duty.

Boeing P-26A ☐ $1.75 Stinson Reliant Airliner ☐ $2.50
Martin Bomber ☐ $3.50 Curtiss Goshawk ☐ $2.00
Ryan S T ☐ $1.50 S. S. Normandie ☐ $7.00
Tru-Cut Nife ☐ 15c Catalogue Bulletin ☐ .5c

Please print name.....
Address.....
City..... State.....

Balloons

(*Continued from page* 344)

ter. What they do then is up to themselves.

The parachute canopies were generally draped outside the basket in World War balloons and will probably be so arranged in the future. While airplane combat crews of flaming or disabled airplanes went hurtling to their deaths for lack of a suitable pack 'chute the balloonatics were saving themselves with the old style open-start 'chute impracticable for airplane use.

Due to the comparative safety of the balloon observer, as compared with the airplane observer (especially since American balloons will hereafter be helium-filled), the former will probably live long enough to become an expert. Even if he jumps he comes down within his own lines. During the World War, experienced balloonatics knew more about actual combat conditions at first hand than any other class of men—from the lads in the front lines to the general with his maps and colored pins and crayon. Many flights of eight to sixteen hours were carried out without interruption.

The balloon is an ideal observation post for ground commanders and their staffs. Probably more battles have been lost through lack of proper and early information delivered to the commander than for any other reason. The balloon's ascension point is generally near the command post of the division or corps commander and is thus easily accessible.

There are no goggles, no terrific slipstream to slap the high-ranker's face and no safety-belt to hold him in an uncomfortable position. It's an interesting fact, but true, that practically no high-rankers outside the Air Service were ever over or near the front lines in an airplane during the late fracas.

In a balloon, the staff officer is able to converse freely with and receive the help of a trained balloon observer who knows his front and the situation thereon. Were the inspection trip made in an airplane, there would always be the danger of its being attacked by enemy pursuit aviation and as practically no staff officers nor ground commanders are aerial gunners there would be no protection for them or the airplane pilot. In a balloon they have the Squadron Defense Section below them, keeping a vigilant lookout.

In fact, with direct telephonic connection with his own headquarters, it is perfectly feasible for a general to direct the course of battle from the basket of a balloon, although I have not heard of any of our super-ground minded ground commanders ever trying out such a thing during these piping days of peace.

The telephone wire runs down from the basket to the winch and is in the core of the cable. From the winch it goes to the telephone exchange and chart room. The observer is in direct communication with all units for which he is observing. Radio, used by the observation *airplane* may be listened to or jammed up by the enemy but the telephone system is practically spy-proof.

In the quiet and comparative safety of a balloon basket it is also easy for an experienced observer to train a new one in his manifold duties. To give an idea of the scope of his job there are enumerated below the many things an observer *must* report upon, not including many other unusual or sporadic activities which he would bring to the attention of his commander:

1. Location of active hostile artillery.
2. All fires and smoke in enemy territory.
3. Load and rail traffic with an estimate of the amount of traffic, its nature and direction. Also traffic jams in friendly territory.
4. All good targets for friendly artillery.
5. All changes in appearance of his sector such as ammunition dumps, new trenches, etc.
6. All enemy balloons, their time and location of ascent and time of descent.
7. Enemy shell bursts and the hostile battery firing them.
8. Signals from his own front lines.
9. Friendly artillery assistance in laying their shots, followed by adjustment (warning them when their subsequent shots wander off the target).

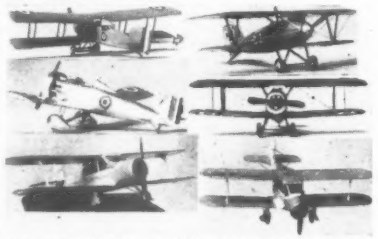
During the World War on a stabilized front, the two observers in one balloon often observed for 25 batteries (100 guns). However these batteries did not need frequent adjustment, as an observer can adjust for but one battery at one moment.

To perform all the duties listed above, the balloon crews use relatively inexpensive aircraft. Balloons can be manufactured quickly and cheaply by many fac-

(*Continued on page* 364)

FINISHED SOLID SCALE MODELS

Ready built models complete in all details with wire riggings insignias, rubber tired wheels, movable controls (but not from cockpit), license numbers and machine guns when needed, and painted in colored lacquers. All orders sent Postpaid and insured.



(Upper left) 11" Breguet $3.00—(Upper right) 7¼" Albatros D.3 $1.80—(Center left) Vickers Jockey $1.80—(Center right) 7" Sop. Camel $1.80—(Bottom) Two views of an 8½" Beechcraft B17L $2.25.

7½" Boeing F4B-4..$2.05	6½" S. E. 5.....$1.80
7¾" Curtiss Goshawk 2.05	6¾" Nieuport 17.... 1.80
9" Consolidated P-30 ..... 2.30	10" Rumpler 2-seater 2.50
9" Vought Corsair. 2.50	10" R. E. 8 2-seater 2.50
8¼" Waco Cabinplane 2.23	8½" Lockheed Electra 2.75

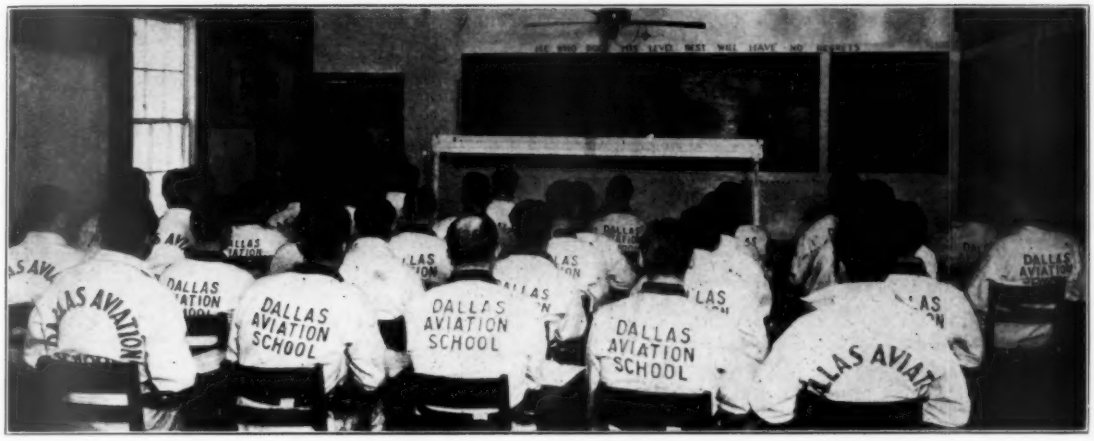
FIGHTING PLANES OF ALL NATIONS
With Proper Insignia and Markings

6¾" UNITED STATES Boeing P-26A.....$2.05
8¼" BELGIAN Renard $1.90—8" BRAZILIAN Waco 2.25
7½" BRITISH Hawker Fury $2.05; West. Pterodac. 2.30
9½" CHILE Falcon $2.50—7¾" DUTCH Fokker D-17 2.05
7½" CHINESE Boeing $2.05; Falcon..... 2.50
11" FRENCH Potez $2.50; 8" Dewoitine D-27-Cl. 1.90
9½" GREEK Fairey $2.50—8½" ITALIAN Fiat Obser. 2.25
8¼" JAPANESE Nakajima 91 $1.90; 7½" Kawasaki. 2.05
8" RUSSIAN R. 5 $2.25—7½" SWEDISH Jaktfalk 2.05

P. O. Box 180A **CHRISTIE BATLAS** Morgantown, W. Va.

Dallas Aviation School and Air College

LOVE FIELD — *A Government Approved School — Established 1926* — DALLAS, TEXAS



Students in Classroom Receiving Practical Instruction in Use of Slide Rule

More and Better Training for Less Money

Courses We Offer:

- Master Airman
- Transport Pilot
- Limited Commercial Pilot
- Private Pilot
- Amateur Pilot
- Advanced Aviation
- Master Mechanics
- Combined Mechanical and Flight Courses
- Radio Courses
- Metal and Wood Working
- Aircraft Instruments

A Complete Aviation School

12 good ships—30 motors—
55,000 sq. ft. of floor space.
268 acres at Love Field.

Here We Have for You . . .

everything necessary to make your aviation training a success; a wonderful airport, best aviation weather in the country, class rooms, shops, hangars and equipment galore.

Our Texas Centennial catalog is now available to those that are interested in a course in aviation. This school compares favorably with any in the nation. Write us for full information. We cooperate with every student to the fullest extent at all times. You need our training. It's worth more than it costs.

Let us hear from you NOW.

You Can't Buy More— Why Pay More?

The Texas Centennial will be held at Dallas from June to December this year. Be here!

Dallas Aviation School & Air College

Maj. W. F. Long, Pres. — *C. E. Harman, Sec'y-Tres.*

LOVE FIELD — DALLAS, TEXAS

Subscribe to
POPULAR AVIATION
608 S. Dearborn St., Chicago, Ill.

BALSA WHEELS 1C ea
1/2", 3/4", 1", 1 3/4" Perfect wheels rushed to you. Giant values—highest quality with a money back guarantee. Break records easily by using Modern Supplies. Order Now!
Balsa Wood 18" length: 1/16x1/16 ...100—5c; 1/16x1/8 .... 50—5c; 1/8x1/8 .... 32—5c
18" Sheets: 1/16x2 .....6—8c; 1/8x2 .....4—8c
Quality Cement: 2 oz., 6" tube. 8c
AA Jap Tissue: Any color 3 for 5c
Prop Hanger 3—2c Wire any size 8" 1c
Free list. Dealers Write 5c post, on supplies
MODERN MODELS
1846 W. 34 Place B Chicago, Ill.

BE A PILOT • FLY A SHIP

If you are stumped at the high cost of training to qualify for a license and a good future in aviation—write, enclosing stamp, for information on our

APPRENTICE PLAN

MECHANIX UNIVERSAL AVIATION SERVICE, Inc
Strathmoor Sta., Dept. B2, Detroit, Mich.

AERONAUTICAL UNIVERSITY
Founded by Curtiss-Wright
Government Approved - State Accredited
AU ACCREDITED
The School the AVIATION Industry Calls on for TRAINED MEN
Right in the center of Air Transportation Industry where hiring is going on constantly.
Outstanding Faculty
Up-to-date Equipment
Reasonable Tuition — Easy Terms
Write for Free Catalog
Address Dept. P. A. - Curtiss-Wright Bldg.
1338 S. Michigan Blvd., Chicago, Illinois

Balloons

(*Continued from page 362*)

tories or mills which now manufacture cotton or rubber goods. Although an airplane mechanic might throw up his hands in despair if ordered to assemble the fabric, cordage and basket of a balloon, such assembly is really not difficult. They can be shipped deflated and stored very easily. Furthermore, they can be manufactured in less time than it takes to train observers to man them.

On the other side of the ledger, even the most ardent balloonatic admits certain disadvantages of balloon observation. Vertical photography of enemy positions can be performed only from an airplane. Enemy artillery or ammunition dumps may be concealed behind hills from the oblique view of balloon observers.

While excellent for a division or even a corps, balloon observation cannot penetrate deep into the enemy's country to observe information vital to a field army or the G. H. Q. of our land forces, although as high as 16 to 25-power glasses can be used when the air is still and there is little oscillation of the balloon or basket. Every experienced airplane pilot or passenger is familiar with the frequent hazes which allow good vertical visibility but practically none in an oblique or horizontal direction. Low clouds may cut down ascension height and add to the disadvantages of extremely oblique vision.

One great disadvantage, that of vulnerability to airplane attack, is removed as far as this country is concerned by the availability of helium which is a monopoly of the United States. Bullets shot from aircraft guns into the bag cause but very small leaks. Incendiary bullets would have no explosive effect as with hydrogen.

Time fuzed bombs can be dropped on the bag from an airplane but, to do so, the enemy plane must fly over a certain small area upon which all the machine guns of the Defense Section can be trained. Balloons ascend back of and higher than the range of enemy light artillery using fuzed shells and cannot be shot down by such artillery.

There has been little real change in observation balloon design since the World War. Late in 1928 the writer received a photograph and description of a German "sausage" with a controllable rudder and elevators and an outboard motor with airscrew fastened on the basket. This country was experimenting with such an accessory at about the same time. However the results obtained have not entirely justified such motorization of balloons for the purpose of shifting them to and from the front lines ascension points.

In general, the observation balloon is shaped like that weird musical instrument, the ocarina, or "sweet potato." The blunt end is forward and up. The narrow rear end has several horizontal lobes, while beneath it hangs a pouch which can be opened to receive air (from the wind). Such appendages stabilize the balloon considerably. The popular type spherical balloon is the free balloon in which weather-minded balloonatics are accustomed to take aerial jaunts.

With helium a larger balloon than the hydrogen-filled bag is necessary to offset the less buoyant helium. The present hydrogen bag is about 93 feet long by 27 feet at its greatest diameter and with about 35,500 cubic feet of gas.

More elevation is also an advantage. Lighter-than-air experts at the Air Corps Tactical School feel that 8,000 feet would be an ideal altitude for most forms of observation. More altitude means more dead load — the cable — which must be compensated for by again increasing the size of the bag.

In actual warfare the Squadron Commander coming up for duty in a strange sector look the maps and the actual terrain over and then picks out a number of points he desires to use for his squadron. One is the inflation point which is back out of enemy artillery range.

This point must be connected with the ascension point by good or fair roads and the maneuvering crew and winch truck take the inflated balloon from one point to another.

This they can do at about a 12 m.p.h. speed, allowing it just enough altitude to clear the trees. At night after a day's duty the balloon is brought back to the inflation point.

END.

MODEL DEALERS
Visit Our New Plant and the
TEXAS CENTENNIAL
BOTH WILL SURPRISE YOU IN QUALITY AND SIZE!
Many Eastern visitors tell us our stock of Kits and supplies is by far larger than any similar concern in the United States. That's covering a lot of territory and may or may not be true, but we do know that our quality and our average prices can not be beat. We do not use "come on" prices on a few items and overcharge on others, nor do we buy poor quality to meet competition. Large quantity purchases and rapid turnover enable us to give Quality, Price and Service—A Rare Combination! If you can't visit us, send us your next order and results will convince you.
Send for Complete Wholesale Catalog from Which A Few Prices Are Quoted Below:

BALSA BALLOON WHEELS
1/2" Dozen .08
3/4" Dozen .10
1" Dozen .12
1 3/8" Dozen .18
2" Dozen .30

BIRCH HARDWOOD WHEELS
1/2" Dozen .04
3/4" Dozen .05
1" Dozen .07
1 3/8" Dozen .09
1 7/8" Dozen .14

HOLLOW ALUM. WHEELS
1" Dozen .30
1 3/4" Dozen .42
1 7/8" Dozen .54

BALSA PROPS MACHINE CUT
4" Dozen .11
5" Dozen .13
6" Dozen .15
7" Dozen .18
8" Dozen .21
9" Dozen .23
10" Dozen .30
12" Dozen .44
14" Dozen .63
16" Dozen .78

MUSIC WIRE
Straightened 3' Lengths
.020 Diam. 30 Lgths. .22
.024 Diam. 30 Lgths. .26
.029 Diam. 30 Lgths. .30
.031 Diam. 20 Lgths. .33
.045 Diam. 20 Lgths. .73

PAULOWNIA JAPANESE PROPS—VARNISHED
5" Dozen .54
6" Dozen .72
7" Dozen .84
8" 6 for .50
9" 6 for .65
10" 6 for .72

PROP BEARINGS
Small—
Dozen .03
Gross .55
Medium—
Dozen .06
Gross .60
Extra Large—
Dozen .10
Gross 1.00

BEST AA TISSUE
White, Doz. .10
Colored, Doz. .12
Aluminum, Doz. .20

DIE-CUT INSIGNIA
U.S., French, British and German Cross.
3/4" Dozen .04
1" Dozen .05
1 1/2" Dozen .07
2" Dozen .09
500 Asstd. 2.00

CELLULOID MOTORS
Radial 9 Cyl. New Type
1 1/2" Diam. 6 for .30
2" Diam. 6 for .45
3" Diam. 3 for .30

Mail Address 1820 Fair Bldg.
MODERN MODEL SHOP
FORT WORTH, TEXAS
Plant Located 906 Pennsylvania Ave.

NOW!
Due to recent requests we have created 3 types of membership, making it easier for many fellows to join the NAR. Investigate this today.
Send 10c for membership leaflets, application blank and club newspaper—FLYING NEWS.
National Aero Reserve 114 W. 16 St. N.Y.C.

NEW CURTISS F11C4 NAVY PURSUIT

28" Span. Length 20½". Weight 4 oz. 1" Scale

THE MOST EXCLUSIVE AND FINEST EQUIPPED MODEL IN THE WORLD

A special De Luxe model, one of the most beautiful and finely detailed ever made, with its special exact scale 3¾" celluloid, 700 H.P. type, Wright Cyclone motor, having aluminum push rods, cylinder fins, etc., like real motor. Also in set are 4" aluminum cowl ring, 9" carved spruce semi-scale flying propeller, colored star and rudder insignia, 2" celluloid balloon wheels, silver dope, paint, black, red striping, Navy lettering, wire parts formed, axles, rubber motor, windshield, instrument board, flying wires, 4 aluminum step plates, aluminum wing walks, ready cut wheel pants, etc. All other parts printed on balsa. Detail scale drawing.

Construction Set Complete, postpaid **$4.50**

NEW BOEING P26A ARMY FIGHTER

22" Span. Length 17½". Wt. 2½ oz. ¾" Scale

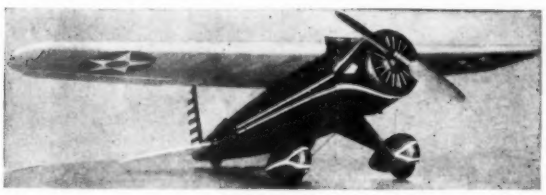
Above photo shows finest equipped model of this plane on the market. Having ready made motor, cowl, prop, etc., it is very easy to build and is a beauty. Const. set contains 3" celluloid motor, 3¼" spun tapered aluminum cowl ring, 8" steel type paulownia wood prop, 1⅝" celluloid wheels, tail wheel, insignias, windshield, instrument board, 1 oz. yellow dope, 1 oz. blue, cement, glue, all parts printed on balsa, and drawing.

Const. set in labeled box, postpaid **$2.75**

Same set with completely finished hollow balsa fuselage, wing stubs, headrest, and rubber installed.

Set, postpaid **$4.50**

41" LOCKHEED ARMY SPEED VEGA

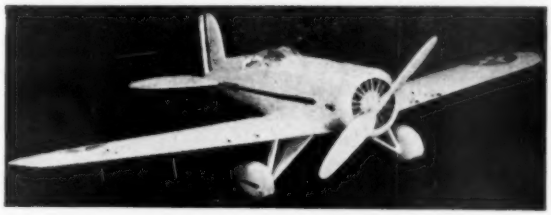


41" Span. Length 28". Wt. 8 oz. 1" Scale

This new model, built very strong yet light in weight, is practically crashproof and will out-perform any large scale model built. Rises from ground in 10 feet and flies over 650 feet. Set contains all parts printed on balsa, ready cut pant cores, 4¼" turned motor front, 11" steel type carved paulownia wood propeller, 2½" balsa wheels, tail wheel, formed wire parts, 26" rubber, 3 oz. yellow dope, 2 oz. blue, cement ½ oz. black, 2 oz. glue, covering, full size scale drawing, and all parts.

Construction Set complete, postpaid **$4.95**

NEW LOCKHEED P23A NAVY FIGHTER



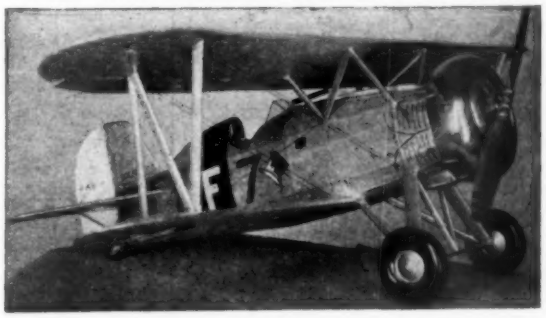
COMBINATION LAND AND SEA PLANE SET

32" Span. Length 22½". Weight 3½ oz. ¾" Scale

New 4-gun Navy fighter. Model will rise from land or water in few feet. Construction set contains fuselage and pontoon formers, wing ribs, tips, etc., printed on balsa, a 3¾" turned cowl front, 2 instrument boards, colored insignia, lettering, windshields, 9" carved scale flying prop shown, 3 oz. silver paint, 1 oz. cement, ½ oz. black, 2 oz. glue, ready cut wheel pants, strong 2" aluminum wheels, 12 foot rubber, large 33"x44" drawing of land and sea plane. This is a sensational model and only one of its type in the world.

Construction Set in labeled gift box, postpaid **$2.95**

NEW BOEING F4B4 NAVY FIGHTER



22⅝" Span. Length 14⅛". Weight 2½ oz. Color, Silver and Yellow

This is the finest equipped Boeing, F4B4 model in the world. New improved model exclusively equipped with new 3¼" special aluminum streamline tapered cowl ring, 9 cylinder celluloid motor with aluminum ventilator front, 8" carved varnished propeller, printed out balsa wood parts, silver dope, paper cement, glue, formed wire parts, celluloid wheels, tail wheel, U. S. Navy lettering, colored insignia, and ¾" scale drawing. **Construction Set Complete, postpaid** **$2.95**

NEW NORTHROP FT1 NAVY FIGHTER

22" Span. Length 15". Weight 2½ oz. ¾" Scale

A beautiful flying model of the latest Northrop 280 m.p.h. fighter. Set contains 3" turned motor front, 8" carved propeller, insignia, silver, black and clear dope, glue, all parts printed on balsa, full scale drawing, and all parts to build as shown.

Construction Set Complete, postpaid **$2.00**

NEW NORTHROP D2 ARMY PURSUIT

36" Span. Weight 4 oz. ¾" Scale

A de luxe set including 3" 9-cylinder celluloid motor, special 3¼" streamline tapered aluminum cowl, 9" steel type carved prop, all parts printed on balsa, silver paint, glue, tissue, aluminum, motor front, wheels, insignia, wire parts tissue, and scale drawing.

Const. Set complete, postpaid **$3.95**

WEDELL WILLIAMS RACER

13" Span. Length 10½". Color, gold. ½" Scale

A beautiful small model. All parts printed on balsa, carved, varnished prop, gold dope, glue, etc., detail drawing and all parts to make as shown.

Const. set, postpaid **75c**

CURTISS NAVY SEA HAWK P3A

15" Span. Length 10½". Wt. 1¼ oz. Scale ½".

Set contains 2" celluloid motor, aluminum cowl ring, carved prop, 1½" celluloid wheels, all parts printed on balsa, insignia, drawing, etc. This is a dry set, without liquids.

Construction set, postpaid **75c**

CATALOGUE. **Send 3c stamp for 8"x10" Illustrated Catalog, showing large pictures of all models, gas motor driven models, motors, supplies, etc.**

Note: Our models are the easiest to build and finest equipped in the world. All models are equipped with special "Brown" rubber which gives 20% longer flights.

See our ad on gas motor driven models on another page of this magazine.

MINIATURE AIRCRAFT CORP., 83 Low Terrace, New Brighton, New York

Win a FREE Trip to Europe on the new Cunard-White Star Superliner QUEEN MARY

IDEAL Model Ship Building CONTEST

Wonderful Prizes!

Two Free Trips to Europe
28 Cash Awards
Engraved Trophy Cups
'Queen Mary" Commemorative Medals
Hundreds of Special Prizes in Local Contests
Free Coupon to all Contestants for Inspection Pass to Visit the Ship.

Build a Model of the latest Greyhound of the Sea—the gigantic Cunard-White Star Superliner "QUEEN MARY", now being completed and due in New York June 1st. Enter this Big National Contest offering valuable prizes, and also get into the Local Contest in your city offering hundreds of Special Prizes. Start your Model now!

Complete Official Contest Construction Kit . $1.00

with one-piece fully-shaped Hollow Hull!

With the cooperation of the Cunard-White Star Line, we have designed a simplified construction kit to build an accurate, scale model of the "QUEEN MARY", 18 inches long. Kit contains every item required to complete the model, including a completely shaped one-piece, hollow hull, ready for mounting decks and superstructure. Decks are outline printed on balsa sheets, easily cut to shape and mounted. Printed designs on heavy cardboard for deck enclosures, bridge and other superstructure. Ready materials for all masts, booms, funnels, ventilators, rudder, etc.

22 metal life boats with 48 davits, 2 metal anchors, rigging, and all other details to make a wonderful model reproduction of the big ship. Also cement, colored lacquer, sandpaper, etc. **Full Model Size Working Plan** with 30 "close up" diagrams of important parts and large photographs showing detail views of the finished model for you to follow. Complete step-by-step instructions for every operation—you cannot do it wrong with this kit!

Start to build your Official "QUEEN MARY" Contest Model right away and enroll in this big Model Ship Building Contest. Entry blank, contest rules, full list of prizes, judges' names and all information telling how you can enter both the National and Local Contests included in every kit.

Ask your Dealer, or Send Coupon

Get your Kit at your favorite Department Store, Toy Store, Craftsman or Hobby Shop. Be sure to get the IDEAL Official "QUEEN MARY" Contest Kit; look for the name on the box. If unobtainable, send the coupon below.

DEALERS: This is the Contest all Model Builders are entering. Write for details and proposition on your own Local Contest.

The IDEAL Company,
22-26 West 19th Street, New York, N. Y.

Please send me the IDEAL Official "QUEEN MARY" Contest Kit, for which I enclose $1.00, plus 10 cents for postage.
Please send me Special "QUEEN MARY" Contest Circular.

Name .....
Address .....
City ..... State .....

Old Baldy

(*Continued from page 328*)

glided off on a current, out of range.

This time we had our enemy over a box canon long enough to seem reasonably safe. I once more banked into position, slipped down and then skidded, but our quarry was on his "wing-tips" and ready for us. He slipped into a turn, zoomed and spun away.

I was much too busy trying to dodge cliffs, to keep an eye on the bird. Like all other wildlings he seemed to melt into the ground when we got above him, because his plumage was of a protective color.

After much maneuvering, we got over him again. Down we came, with the air whistling around us like a Scotch dirge. I skidded and heard the crack of Bill's gun behind me. Feathers flew. The eagle dropped off on the right wing, fell a few feet, righted himself, sailed a few seconds, fell off on the right again, and went down. We had made our first kill.

After shooting two or three more, which were easier game and alert all the time for old Baldy, we gave up and started home. We had learned a thing or two about our enemies during the day's hunt. Most of our misses were caused by wind velocity and the momentum of the ship.

Bill had difficulty for he could only shoot within a fifteen degree radius because of the short distance between propeller and wings. Another trouble was that it was impossible to pierce the bird's body from above. An eagle's bone and wing structure are so thick a shot could hardly touch him. I decided that a shot from below, if we could manage it, would be most effective.

It was exceedingly dangerous to leave old Baldy wounded and vengeful. He would then be a menace to the whole district. We felt obliged to return by the same route we had followed at the start hoping to get another chance.

All the way back we watched for his wheeling, gliding flight. We'd have to come back another day—no sign of his wide spread wings and short wheeling turns showed up against the blue above or the shadow filled canons below us. I know Bill was completely disappointed, even though four other big fellows had fallen to our gun.

At the last barrier of those hills, a piercing scream suddenly bruised the air like the whine of a bullet. It sounded like the death cry of a brute who has been fatally hurt. I jerked my head back quickly.

There, just above the open ship, old Baldy hovered—perhaps two hundred feet above us—and as I looked he folded up his wings and pounced down on us like an inverted rocket. He had been waiting, hidden on some high rocky point, watching for our return.

I kicked the ship into a skid and I felt his wing strike the fuselage of the plane as he spread it out to check his flight. The force of the blow was like a concussion from a shell burst.

I'm not sure yet just how I righted the ship and got along on my way. It's a wonder we didn't go into a tail-spin. All I could think of at the moment, and for some time to come, was those golden yellow hate-filled glaring eyes, the gaping beak and needle-like talons. If he had struck—he could have lifted my scalp, helmet and all, from my head like a toupee and knocked the plane into a nose-dive.

We were right over a blind canon. The cliffs kept getting closer and we were not yet in firing position. The eagle had already picked his landing place and there was none for us, so I pulled up the face of that six hundred foot rock in a half loop and then rolled out in an Immelman turn

Bill all but lost his gun and, when he turned around to yell at me, I could see his eyes sticking out of his face like door knobs. He was pretty white and I'm sure I was bleached myself. I know we missed that wall by inches!

I took a breathing spell, circling a little, and then came back. Old Baldy was just where we last saw him. I tried flying along the side wall, shooting at him as we dashed by. This was no more successful than our other attempt.

(*Concluded on page 381*)

Speedy 14 Cylinder HUGHES RACER

NEW! Cleveland-Designed

20" REP SCALE FLYING MODELS AT HALF the usual PRICE

you've been paying for similar models

The hit Kits of 1936. In realism, flying qualities and completeness of detail, these big 20" REP (Representative-Duration) beauties even outshine many Kits costing twice and three times as much. Each Kit an amazing value—with printed out wood, super-detailed drawings, finished scale wood wheels, real C-D model airplane rubber—everything—EXCEPT LIQUIDS (if you're satisfied with the ordinary 5 for 5c liquids as supplied by others, just add 5c extra to your order, and you shall have them, too). Only a limited number of each model is being manufactured, so act quick. See your dealer at once, if he can't supply you, order direct—by check or money order (no C.O.D.'s). Kits for the following models are ready: Kit R52, "Mister Mulligan", 50c; Kit R21, Hawk P6-E, 50c; Kit R15, Fokker D-7, 50c; Kit R54, Hughes Racer, 75c; Kit R56, Consolidated A-11, 40c. No postage charge. (English, Canadian and Mexican customers; add 10%; all others 20%.). *Send 3c stamp for catalog of all C-D models and supplies.*

"Mr. Mulligan"

CLEVELAND MODEL & SUPPLY CO., INC.
1866PA West 57th St., Cleveland, Ohio

"900 Foot flights" THEY WRITE
"Fly Like Birds"

From NORTH to SOUTH from EAST to WEST EVERY BODY IS FLYING OUR

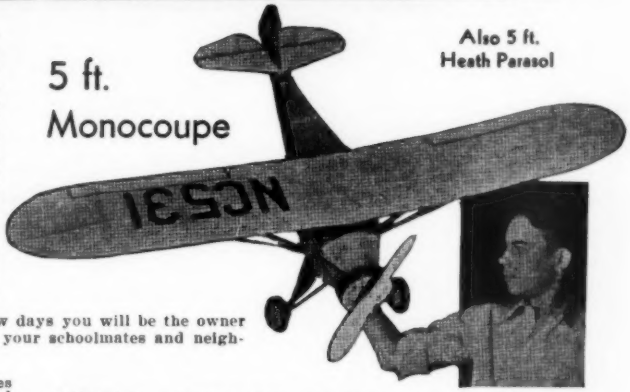
5 FOOT SCALE MODELS ACTUALLY The SIZE 1/3 of REAL PLANES!

$1 EACH PLUS 35c for PACKING, POSTAGE & INSURANCE

IF EXPRESS COLLECT SEND ONLY $1.00

Yes Sir—Everybody is flying G. H. Q. planes! The entire country it seems has become Giant Model conscious, if we are to judge by the unprecedented number of people writing us to get them—and then too, letters that are delirious with joy speaking of the real flying achievements of these planes that are actually 1/3 the size of real passenger carrying planes. 40,000 of these models have been sold and built (proof of this in our files)—representing 40,000 enthusiastic endorsers of our planes. Doesn't it thrill you? Imagine!—amazing gigantic models—each a strong outdoor flyer!—$10.00 value for only $1.00. Everything is in the kit INCLUDING ALL LIQUIDS—nothing else to buy! There is no catch! Inspect our kits at any dealer or read for yourself what each kit contains. If you are not convinced that our kits are the biggest values, don't order. If you already realize what bargains our kits are, send your order today and in a few days you will be the owner of a beautiful flying scale model that will make you the envy of your schoolmates and neighborhood.

5 FT. STINSON RELIANT



CONTENTS: Each of these new G. H. Q. Giant 5 ft. Model Planes contains full size Plans, all ribs, formers and curved parts clearly printed on best grade Balsa. Large bottles Cement and Dope, different colors Japanese Tissue, Special Endurance Rubber, finished Ready-Cut 2" Wheels, Wire, Balsa strips cut to size, Washers and . . . Movable Controls, shock-proof Landing Gear, Scale Details, Lettering, Numbering and Insignias, Flight Log, etc.

NOTE: We have dealers in almost every city. Visit your dealer first for our kits. If you cannot locate a dealer who can supply you, order direct from us. Send money order, check, stamps, or cash. Send only one dollar if you want express delivery, charges collect.

24 HOUR SERVICE ON ALL ORDERS

Why Are G. H. Q. KITS BEST FLYERS?

Hold up to light for Answer!

And Don't Forget These Marvelous G. H. Q. Values:

24" FLYING SCALE MODELS 25c plus 10c packing, postage insurance

Each 24" G. H. Q. Kit is complete in every detail. A liberal quantity of everything. Twenty-one models to select from at 25c each.

Puss Moth	SE5	Aeronca	Curtiss-Robin
Polish Fighter	Aeromarine	Fokker D-8	Curtiss JN4
Army Falcon	Army Hawk	Nieuport	Bellanca
Sopwith Camel	Monocoupe	Douglas Mailplane	Spad
Fokker D-7	Fairchild "22"	Stinson "R"	Jap Kawasaki
			Russian Fighter

36" FLYING SCALE MODELS 50c plus 20c packing, postage, insurance

G. H. Q. Scale Models are the best Kits your money can buy for appearance and flights. Buy one today and you'll buy a whole fleet of them. Get acquainted with G. H. Q. Kits and no others will do.

36" CURTISS A-8 ATTACK 50c; ALSO 36" NORTHROP GAMMA "SKY CHIEF" 50c 36" DOUGLAS Y-12 50c—COMPLETE IN EVERY DETAIL—

We have a complete line of kits from 10c to $1.00

SEND MONEY ORDER, CHECKS, STAMPS OR CASH. Don't Fail to Include Postage for Each Kit With Your Order. ONE-DAY SERVICE.

G. H. Q. MODEL AIRPLANE CO.

564P Southern Boulevard New York, N. Y.

FREE POSTAGE ON ALL ORDERS IN UNITED STATES FOR 75c OR OVER, EXCEPT WEST OF MISS. ADD 10c. CANADA AND FOREIGN, ADD 15%. UNDER 75c, ADD 15c.

36" Lengths, add 10c for packing.

Send 3c stamp for illustrated Catalog, Free with orders

NO STAMPS NO C. O. D's.

Add 5c to each check for collection.

NO ORDERS ACCEPTED FOR LESS THAN 25c.

With all orders for $1.00 or over **FREE**

2 OZ. CLEAR CEMENT AND 2 SHEETS SILVER TISSUE

Dealers, Clubs, Schools: Send for Price List

20 IN. FLYING PLANS 10c—3 for 25c

Sparrow Hawk, Boeing Trans. 247, Spad Chass., Vought Corsair, Curtiss Swift L. W., Waco Cabin Biplane, Douglas Dolphin, Boeing P-12-F, Fokker D-VII, SE5, Goshawk, Gee Bee.

18 IN. LENGTHS

1/16x1/16.....100 for 5c
1/16x1/8..... 35 for 5c
1/8x1/8..... 30 for 5c
1/8x1/4..... 10 for 5c
1/4x1/4..... 5 for 5c
1/2x1/2..... 2 for 5c

18 IN. SHEETS

1/32 or 1/16x2. 8 for 10c
1/8x2 ..... 6 for 10c
1/4x2 ..... 3 for 9c

3" sheets, double these prices.

18 IN. PLANKS

1x1 1 for 4c|2x2 1 for 18c
1x2 1 for 10c|2x3 1 for 23c

JAPANESE TISSUE

1 doz. all colors, AA 19c

SILVER TISSUE

20"x24" .....each 5c

SUPER-FINE TISSUE

White only.
Each 5c: doz. 50c

BALSA WHEELS

1/2"... 3c 3/4"... 4c
1"... 5c 1 1/4"... 7c
2"...10c 3"...17c

BIRCH WHEELS

1/2"...2c 3/4"...3c
1"...4c 1 1/4"...5c
2"...10c

DOWELS

1/16x6 dz.5c 1/4x15, 2 for 5c

CLEAR DOPE

1 oz....5c 1/2 pt....30c

COLORED DOPE

1 oz. bot., all colors...5c

CLEAR CEMENT

1 oz. bot. 5c; 2 oz. bot. 10c
1/2 pt. bot.....35c

BAMBOO

1/16x1/16x12...36 for 5c
1/16x1/4x15, ea. 1c; doz. 10c

SHEET CELLULOID

6x8....5c 12 1/2x16...20c

CELLULOID WHEELS

3/4" pr. 5c 1 1/4" pr. 10c
1" pr. 7c 1 1/2" pr. 17c
3" pair 30c

DUMMY RAD. ENG.

1 1/2" d. 18; 2" d. 23; 3" d. 33

ENGINE AND COWL ATTACHED

1 1/2" dia. 20; 3" dia. 35

CELLULOID PANTS

1/2" to 1"..... pair 18
1 1/2" to 1 3/4"..... pair 33

INSIGNIA SHEET

24 insignia and stripes 5c

WASHERS

1 doz. 1/8 or 1/4..... 1c

PROPELLER BLOCKS

1/2x 3/4x 6.....6 for 5c
3/4x1 x 7.....3 for 5c
3/4x1 x 8.....3 for 5c
3/4x1 1/4x10.....2 for 5c
3/4x1 1/4x12.....1 for 4c
1 x1 1/2x12.....1 for 7c
1 x1 1/2x15.....1 for 9c

SHEET ALUMINUM

.005 in. thick, 6x6.....5c
.010 in. thick, 6x6.....6c

THRUST BEARINGS

Small, doz. 10c
Large, doz. 15c

RUBBER

1/16x1/16 or .045...18 ft. 5c
1/8 flat.....15 ft. 5c

WOOD VEN. PAPER

20x30 .....1 for 10c

METAL PROPELLERS

2 blades 3 blades
1 1/2".....33 10
2 1/2".....12 15
3 1/2".....18 20
4 1/2".....20 25

Balsa Machine-Cut PROPS

5"..... 5c 6"..... 6c
7"..... 7c 8"..... 8c
10"....10c 12"....12c

ALUM. COWLINGS

1 1/2" 15; 2" 18; 3" 25

Specify whether anti-drag, closed or open.

BOMBS

3/4" 04; 1 1/4" 07; 3" 12

GUNS WITH RING MOUNT

1 1/4"....10; 1 3/4"....15

PURSUIT MACH. GUNS

3/4", 1 1/4", or 1 3/4", ea. 05

WING AND TAIL LIGHTS

12" 10c; 15" 15c; 24" 20c

MECHANICAL PENCIL

WATER SPRAYER...15c

WIRE 2 ft. 1c; 25 ft. 10c

MODEL PINS, pkg....5c

THINNERS, 1 oz. bot. 5c

REED, 2 ft..... 1c

BUSHINGS, 1 doz... 3c

SANDPAPER, pkg... 5c

PROP. SHAFTS, doz. 8c

NOSE PLUGS, doz...10c

IMPERIAL MODEL AERO SUPPLY, Dept. A
416 McDonald Ave., Kensington Sta., Brooklyn, N. Y.

See G. H. Q. Ad on preceding page

- Each kit contains all parts for a complete outdoor flyer.
- Each part is accurate to the last detail.
- Plans are full size.
- Plans are authentically designed.
- Materials are of very best quality.
- All models are flight tested.
- All G. H. Q. kits are easy to build.

Airy Chat

(*Continued from page 316*)

RAOUL HOFFMAN is, in many ways, a mechanical and aeronautical genius. His engineering experience dates over a period of many years and in many industries. We feel sure that you appreciate the value of his nomographs which are real labor savers for anyone who has aeronautical calculations to make and besides they are highly educational.

* * *

MR. HOFFMAN has agreed to carry on the series of articles on stress analysis that I started in the April issue and I know that aero students and engineers all over the world will appreciate this fine series from the pen of a man who has had much experience in aircraft design. He can present very complex subjects in an easily understood non-technical manner and this is a real accomplishment.

* * *

WE HAVE had many requests for scale drawings of airplanes, not models but the full size ship. In our next issue we intend to start a series of what our readers call "three-view plans." The correct name, however, is "orthographic projection" in which two, three or more right elevations or views are shown in a definite relation to one another.

* * *

HEY-HEY, you Chicago flying flea builders. There is a young man, William Mee, who desires to enter into partnership with some other young man and share the expenses in building a Flying Flea or some other type of light-plane. Write to him direct: William Mee, 4811 Lake Park Avenue, Chicago, Ill.

* * *

WE HAVE with us in this issue, no other than Joe James, former army pilot, barnstormer and pilot in the original Gates Flying Circus. His information regarding this famous old-time organization is first handed and as he writes well, we are sure that he will captivate your attention. Stories about the Gates Circus never grow old and, in addition to being entertaining they are highly educational and informative.

* * *

WHEN writing for the address of a well known pilot, and particularly a racing or stunt pilot, please bear in mind that the majority of these men are continuously moving about and seldom stay at one address for any length of time. It is the nature of their business. Therefore, we find it almost impossible to carry an accurate, up-to-date file of pilot addresses that will be of any assistance to our readers. And, unlike movie stars with big publicity staffs behind them, pilots seldom answer fan letters even when the letters do reach them.

* * *

THE WRITER is fond of gathering statistics on various activities, and among these statistical fads that he has carried on for many years, is information concerning the number of Chinese students in our flying schools. I am firmly persuaded that there are very few schools, even among the very small schools, that have not at some time, had a Chinese student. The interest of the Chinese boys in aviation is very intense and they report diligently at every airport where flying is taught.

Just to satisfy my curiosity, I would like to see contributions on this subject from the various flying schools.

* * *

WE have received several issues of a very interesting and informative paper known as The Soaring Cycle, which is devoted to the many phases of soaring flight. This takes up the many theories connected with soaring and attacks the subject in a technical manner. The publishers, The Soaring Flight Company, 1726 Pennsylvania Ave., Northwest, Washington, D. C., inform us that the initial issues (two) will be supplied gratis to those who make their request as a result of reading this review. Mention POPULAR AVIATION when you write.

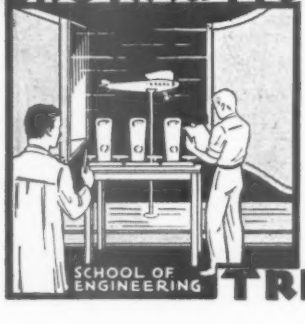
* * *

OH, YES! There was an error in my strength of materials article in the April issue. The equation reading $F = \frac{WV^2}{2g}$ should have been $F = \frac{WV^2}{2gD}$. The distance (D) was lost for some reason.

* * *

WITH this beautiful weather all about me, the birds chirping and the warm breezes blowing, I am becoming airminded for the thirty-first time. Gee, if I could only get one of those Vidal $700 airplanes now, I would be going places—you bet! J. B. R.

AERONAUTICAL ENGINEERING
DEGREE IN 2 YEARS



Become an Aeronautical Engineer. Tri-State College course given in 1/8 weeks. Bachelor of Science degree. Graduates in Mechanical Engineering can complete aeronautical course in 2 terms (24 weeks). Thorough training in all fundamental engineering subjects. Equipped with wind-tunnel (see illustration). Non-essentials eliminated. Courses designed to save student time and money. Flying school facilities available at nearby airports. Properly trained engineers in design, research, manufacture and sales work are in demand. Enter March, June, September, January. Courses are offered also in Civil, Electrical, Mechanical, Chemical, Radio and Architectural Engineering; Business Administration and Accounting. Living costs and tuition low. Those who lack high school may make up work. World famous for technical 2-year courses. Graduates successful. Write for catalog.

756 COLLEGE AVE. ANGOLA, IND.

TRI-STATE COLLEGE

The Quickest way TO A WELL PAYING POSITION ..with a Future

RYAN SCHOOL OF AERONAUTICS
Lindbergh Field, San Diego, California

I am interested in courses checked: Please send additional information.

☐ Transport	$1975	☐ Master Mechanics	$ 550
☐ Limited Commercial	585	☐ Weems Navigation	150
☐ Private	585	☐ Aircraft Welding	100
☐ Amateur	395	☐ Aircraft Radio	35
☐ Ryan deluxe Combination Course Transport training plus new Ryan S-T high performance plane			4642

Name _____ Age _____

Address _____

City _____

Specialize for your future at America's Most Modern School. Quick, practical training to meet present demands planned for you in cooperation with major factories.

RYAN SCHOOL OF AERONAUTICS

15 Ryan S-T Planes Sold To Georgia Dealer

NORTH AMERICAN AVIATION ... HUGE NEW

30 New Planes For Airline

Delivery of Douglas DST and DC-3s will climax the new equipment program launched by American Airlines, Inc., at a cost of more than $2,300,000.

Orders for new equipment scheduled for delivery early this year exceed $2,260,000, including 20 Douglas DC-3 dayplanes, and DST Sleeper Transports.

BIGGEST YEAR IN AVIAT

Los Angeles, Cal. Jan 2 (I... Southern California's greatest ... aviation has just been conclu... Every phase of the industry ... tered tremendous increases dur...

Consolidated Plant

The new Consolidated pla... rs an aggregate of 225,000 ... eet, with ample room for exp... n the 33 acre site turned over ... ompany by the city of San ... A ramp, constructed by the ci... San Diego, is to be available fo... handling of amphibians and ... planes, and the airport itself wi... available for testing and flying a... new planes. The plant comp... hree separate buildings. The ... ipal building houses the engi... ory and the offices a... departments. A s...

...ge Contracts Let By Army

...2,000,000 Involved

Washington, (D.C.) Tuesday — Contracts announced today by the War Department which involve a total of 115 attack planes and 103 bombers were let to the following companies:

The Northrop Corporation, Inglewood Cal., received awards covering the equivalent of 115 attack planes, at $2,500,071 and the Douglas Aircraft Company, of Santa Monica, Cal., was awarded the contract for the 90 bombers at $6,498,000.

The Boeing Aircraft Company of Seattle, Wash., received an order for 13 "Flying Fortresses

The Ryan School of ... and Ryan Aeronautics ... taken d... Sikorsky ... second ... planes, ... Hornet ... speed of ... imum sp... Air trav... since No... Island ... then, 60...

...IRCRAFT PLANTS ...CE SHORTAGE

...ral Thousand ...ed Men In ...and

Rec... surveys completed at key points ... Pacific Coast where aircraft ... ng activity has reached an all-... high for the industry show that ... mbined total of upwards of 4... ined experts are in immediate ... d.

High offici... the major factories in the San ... co, Los Angeles and Pacific Nor... t territories are of the one opinio... a labor shortage of trained e... is imminent. A general call ha... n issued by them to all trainin... ols for men suitable for the ... work required. ...

San Diego Air Fair

Following the appointm... Franklin K. Lane as ...

LOCKHEED GETS ... NEW ORDERS

Unfilled orders of Lockheed Aircraft Corporation, local manufacturer, are piling up, according to a statement released yesterday by Robert L. Gross, president. ... pany delivered twenty-... ngine airliners and six ... plan...

Traffic At Peak

... was the third best mon... history of Love Fie... the number of air pa... the field. Duri... 32 airline passenge... airport and 2,3... parted. Traf... over the sam... when 1,477 pa... rived and 1,402 pa... l. Last Augu... best busines... th... world's ... Rob... turner ... Williams, ra... hic... comm... ... Trophy ... 1 ... 1 ...

Plant E

Represe... about $6... gram co... est hang... of uniq... duction ... tional e... been lau... Douglas ... With thi... will repr... of more ... One unit ... side of ... just has ... hangar ... and plans ... a 300-ft. ... the plant ... Foundati... the rear ... posed ne...

Aeronca

(*Continued from page 335*)

metal landing gear fairing and anti-drag ring all combines to give a smart racy appearance.

The cantilever wing, which is tapered in both planform and thickness, is built-up in three sections using spruce spars and ribs. The fuselage is of welded steel tubing. Covering is fabric except for a metal cowling to the rear of the engine. The tail surfaces are welded steel and fabric-covered with a small trimming tab on one elevator, which when operated from the cabin takes care of trimming the plane at any speed.

SPECIFICATIONS
Aeronca C-70

Powered With	LeBlond 70 H.P. Engine
Top Speed	115 m.p.h.
Cruising Speed	100 m.p.h.
Landing Speed	48 m.p.h.
Rate of Climb	455 ft. min.
Service Ceiling	13,000 feet
Cruising Range	500 miles
Gross Weight	1,500 lbs.
Empty Weight	875 lbs.
Useful Load	625 lbs.
Length Overall	22.5 ft.
Wing Span	36.0 ft.
Wing Area	150 sq. ft.
Wing Loading	10 lbs. per sq. ft.
Power Loading	21.4 lbs. per h.p.

END.

FREE SENSATIONAL NEW 1936 CATALOG PACKED WITH VALUES HOT OFF THE PRESS!

Here it is—the greatest catalog in our history. Crammed with values that will stir you to action—and everything is listed at prices which defy competition for the quality we offer. You won't find any "odds and ends". You'll find only quality merchandise—because no model is better than the supplies from which it is built. Among the kits listed are 6" solid models, 15" flyers, 12", 14", 18" gliders and Heathe's sensational record breaking 36" flyers. Here is a catalog designed by model builders for model builders. You need it so get your Free copy TODAY!

TYPICAL VALUES from the MODEL BUILDERS "BIBLE"

BALSA WOOD
(If 36" lengths are desired just double 18" price)

18" BALSA STRIPS
1/32x1/16..100 for .05
1/16x1/16..100 for .05
1/16x1/8 ..22 for .05
1/16x3/16..20 for .05
1/16x1/4 ..17 for .05
3/32x3/32..21 for .05
1/8 x1/8 ..20 for .05
1/8 x3/16..14 for .05
1/8 x1/4 ..10 for .05
1/8 x3/8 .. 8 for .05
3/16x3/16..10 for .05
3/16x1/4 .. 8 for .05
3/16x3/8 .. 6 for .05
1/4 x1/4 .. 8 for .05
1/4 x3/8 .. 5 for .05
1/4 x1/2 .. 4 for .05
1/2 x1/2 .. 3 for .05

18" BALSA PLANKS
1" x 1" ..1 for .07
1" x 2" ..1 for .11
1" x 3" ..1 for .15
1" x 6" ..1 for .25
1½"x 1½" ..1 for .15
2" x 2" ..1 for .20
2" x 3" ..1 for .25
2" x 6" ..1 for .45
3" x 3" ..1 for .40
3" x 6" ..1 for .75

COLORLESS CEMENT
1 oz....05 20 oz....08
4 oz....15 1 pt....50

BAMBOO
1/16 sq. x 12" 35 for .05
1/16x1x11 ...1 for .01
1/16x1/4x11 12 for .07

SANDPAPER
Per package ..... .05

18" BALSA SHEETS
1/64 x 2 ...5 for .10
1/32 x 2 ...7 for .10
1/16 x 2 ...7 for .10
3/32 x 2 ...6 for .10
1/8 x 2 ...5 for .10
3/16 x 2 ...4 for .12
1/4 x 2 ...3 for .11
1/2 x 2 ...2 for .12

BALSA PROPELLER BLOCKS
⅝x ¾x 5 ..7 for .05
½x ¾x 5 ..7 for .05
½x ¾x 6 ..7 for .05
⅝x1 x 7 ..3 for .05
⅝x1 x 8 ..2 for .05
¾x1¼x10 ..1 for .03
¾x1¼x12 ..1 for .04
1 x1½x15 ..1 for .07

COLORED DOPE
White, yellow, orange, red, green, olive drab, blue, black, silver, gold.
1 oz. ..... .05
2 oz. ..... .10
4 oz. ..... .19
1 pint (16 oz.).... .60

CLEAR DOPE
1 oz. ..... .05
2 oz. ..... .07
4 oz. ..... .13
1 pint (16 oz.).. .45

THINNER SAME PRICE AS CLEAR DOPE.

FINEST PARA RUBBER
1/32 x 1/32 30 ft. .05
225 ft. skein.... .30
.045 square 20 ft. .05
225 ft. skein .... .40
3/32 flat 20 ft... .05
225 ft. skein.... .40
1/8 flat 17 ft..... .05
225 ft. skein..... .55
3/16 flat 12 ft... .05
225 ft. skein.... .80

FLANGED BUSHINGS
Doz.
1/16 diam. x 5/32 .05
1/16 diam. x 7/32 .08
3/32 diam. x 1/4 .10
1/8 diam. x 1/2 .20

ALUMINUM LEAF
(.0003 of an inch in thickness, 3⅛ wide)
5 feet for..... .05

SHEET ALUMINUM
Thickness
.002" 6x6 ...1 for .04
.005" 6x6 ...1 for .05
.010" 6x6 ...1 for .06

JAPANESE TISSUE
(White)
2 for 5 Per doz. .18

SHEET CELLULOID
6"x8" .10 12x16 .25

MUSIC WIRE
(straightened)
.014, .020, .028, .034
6 feet ..... .03

THRUST BEARINGS
(small or large)
Each ..... .01½
Per dozen .... .15

MODEL PINS
Per package ..... .05

DOWELS
1/16 dia. x 6" doz. .05
1/16 dia. x 12" doz. .09
1/8 dia. x 18" 2 for .03

REED
1/16" diam. 10 ft. .05
3/32" diam. 8 ft. .05
1/8" diam. 6 ft. .05

INSIGNIA SHEET
12 pr. and Rudder and Tail markings, with gummed back, each only..... .05

WASHERS
1/8 O.D. Per doz. .01
Per gross ..... .10
1/4 O.D. Per doz. .01
Per gross ..... .10

BALSA BALOON WHEELS
(Machine Turned)
½" diam. per pr.. 3c
⅝" diam. per pr.. 4c
1" diam. per pr... 5c
1⅜" diam. per pr. 7c
1⅞" diam. per pr.12c

CELLULOID PANTS
For ¾" or 1" wheel 15c
For 1⅜" or 1⅞" wh. 30c

ALUMINUM TUBING
1/16" O.D. per ft.. 9c
3/32" O.D. per ft.. 7c
1/8" O.D. per ft.. 8c
3/16" O.D. per ft..10c
1/4" O.D. per ft..10c

CELLULOID WHEELS
¾" dia. pr..... 5c
1" dia. pr..... 7c
1⅜" dia. pr.....10c
1⅞" dia. pr.....16c

DUMMY RADIAL ENGINES
1½" dia. 18c
2" dia. 23c
3" dia. 34c

3" DIAM. CELLULOID MOTOR AND DRAG RING COMBINED
Special price 35c

CAST PEDESTALS
for all size solid models
Each 10c

MODEL BUILDERS RAZOR KNIFE
Each 10c

BOMBS
¾" long..... 4c ea.
1¼" long..... 9c ea.
3" long.....14c ea.

2 BLADED PROPS
1½" ..... 9c ea.
2½" .....14c ea.

3 BLADED PROPS
1½" .....10c ea.
2½" .....15c ea.

PURSUIT MACHINE GUNS
ea.
¾" Pursuit Gun 5c
1" Pursuit Gun 5c
1¾" Pursuit Gun 10c

SWIVEL GUNS
¾" long..... 5c ea.
1" long..... 5c ea.
1¾" long.....10c ea.

DIE CAST WING AND TAIL LIGHTS
3 pc. to a set for
12" model.....10c ea.
15" model.....20c ea.
24" model.....30c ea.

MOTOR NOSE PLATES
For 1½" motor 10c ea.
For 2" motor 15c ea.
For 3" motor 20c ea.

ALUMINUM COWLINGS

Size	Anti-drag	Open	Closed
1½"	20c	20c	20c
2"	25c	25c	25c
2½"	28c	30c	30c
3"	30c	35c	35c

CARVED PROPS
5" 5c
6" 6c
7" 7c
8" 8c
10" 10c
12" 12c

FREE
With every order of $1.50 or over, 250 ft. of the finest fresh ¼ flat Para Rubber, free. Add 10c for handling charge of Free Rubber. Free supplies with all other orders.

How to Order—
Add 15c to orders under $1.50. Orders over $1.50 add 10% of order. Canada 10% extra. 36" lengths 10c extra. Add 10c for packing charge of free rubber.

HEATHE MODEL AIRPLANE CO.
438-A5 East 98th St.-Brooklyn, N. Y.

Doping

(*Continued from page 336*)

To get a glossy finish, spray over a final coat of one-third thinner or reducer, one-third color, and one-third clear dope. Lacquer is not recommended for fabric, on account of its inflexibility, and likelihood to crack after exposure or handling.

When doping, or spraying dope or lacquer in damp or humid weather, you will probably find that the dope, etc., will turn whitish, or do what is called blushing. This is due to the fact that in drying fast, the surface tends to become very cold, thus condensing the moisture in the air, and causing the dope to turn whitish, or blush. Sometimes a little more heat will stop it, but this cannot be depended upon.

The best thing to do is to mix about a quarter pint of anti-blush reducer, or slow drying reducer with each gallon of dope or lacquer, that is to be sprayed on. Using reducer instead of thinner will also help. If the surface still blushes after using the above, spray over with a coat of anti-blush after the surface is thoroughly dry.

Anti-blush or slow reducer slows up the drying of the dope, thus reducing the tendency to blush. If the blush is allowed to remain on the finish, a breakdown of the surface will later result at this point. If none of the above methods remove the blush, you will have to defer your doping till a dry day.

Now, many of you, who have done an extra good job in building your ship will want to have a finish on it, well worthy of your efforts. You perhaps have seen factory jobs that had a finish rivalling that of a piano, well you can have the same finish on your ship if you want. It will cost more, and the structure will have to be strong enough to stand the strain of eight coats of dope, and considerable sanding and rubbing.

And, here's how to get that finish. Apply the first three coats clear, and sand lightly after the third. Now give a fourth of clear, and light sand. Then flow on three coats of aluminum, about four ounces of powder to the gallon, leaving ample drying time twixt coats. When the last coat of aluminum has dried about six hours or more, get some 180 C wet or dry water sandpaper, and sand down the surface smooth, dipping the paper in water frequently, and using new paper when the old cuts slow.

After you have the surface down very smooth, wipe off the dust, and spray on a coat of aluminum dope. Let this dry, and sand very lightly with 280 C wet or dry. Do not sand through this coat of aluminum. Now spray on two or three coats of color, spray on very wet. Then sand with 400 wet or dry, and spray over with a very thin coat of color. After this has dried thoroughly, rub down to a glossy surface with rubbing compound, but don't rub through at the lockstitch cords or other projections.

END.

Home of the DAWN PATROL

SPARTAN SCHOOL OF AERONAUTICS

The Dawn Patrol — an organization unique in American aeronautical instruction. Headed by members of the student council and composed of students enrolled at the Spartan School of Aeronautics. To wear the silver wings insignia of membership is to identify YOU with the hundreds of young men and women that have come from all parts of the world, to study todays most fascinating of all professions or trades — *Aviation*, at Spartan — the countries most advanced school of aeronautics. Here, with the Industries most modern equipment available, under the guidance of trained experts — *theory is co-ordinated with actual flying instruction and practical construction and maintenance experience.* Today in responsible positions, members of the Dawn Patrol are playing their part in the day by day progress of Aviation. *YOU can take your place beside them,* the silver wings of the DAWN PATROL are yours, write today for the new 1936 Catalog of SPARTAN Courses — *the fastest and most economical method of entering Aviation!*

SPARTAN
School of Aeronautics

HOME OF THE 13 DAWN PATROL

SPARTAN SCHOOL OF AERONAUTICS
P. O. BOX 2649, TULSA, OKLAHOMA

GENTLEMEN: Send me a copy of the NEW 1936 Spartan Catalog and Supplement describing in detail Spartan 3 ★ ★ ★ STAR Courses of Aeronautics, tuition and detailed living expenses.

NAME_____
ADDRESS_____
CITY_____ STATE_____
AGE_____ Any Previous Flying Experience?_____

Check below branch of aeronautics you are most interested in:

- ☐ FLYING
- ☐ MECHANICAL
- ☐ RADIO-INSTRUMENT
- ☐ EXECUTIVE-MANAGEMENT

BUFFALO PUBLIC LIBRARY
DEPARTMENT OF SCIENCE AND TECHNOLOGY

BIG MONEY Assembling NEW Portable OUTBOARD BOAT

TAKES ANY OUTBOARD 4 H. P. or less

Assemble your OK-2 in 2 days at home! Thousands asked for a light, tough, durable seaworthy, portable, Outboard Boat—and here it is—weight only 50 lbs.! Safe, leak-proof, trouble-free, ideal for touring, hunting, fishing, camping! More speed per H.P., more miles per gallon. Our perfected aluminum-ribbed cut-to-fit construction Kit GUARANTEES successful assembly, quickly, easily, economically. Low Introductory Prices.

RUSH DIME FOR CIRCULAR

MEAD GLIDERS 15 S. Market Dept. E-5 **CHICAGO**

Gates Circus

(*Continued from page 326*)

He was never known to drink or smoke and reputedly had more flying hours to his credit than any other single man in the game at that time. He was strict but always fair and tolerant with his bunch of flying wildcats. I learned to like and respect him a great deal as time went on, and this admiration has never dimmed. He was the only pilot, to my knowledge, who had mastered upsidedown flying at that time.

Two weeks before this I had mailed twenty dollars to my personal mechanic, Nick Gungler of Chicago, to cover half of his fare to New York. During my two years' acquaintance with Nick I learned to depend upon him and his services implicitly. All I had to do was mention the trouble with my ship and Nick would promptly locate and remedy the source of illness so well and so consistently, that I at last forgot my inherent distrust of mechanics who had previously worked on my ships. With Nick I wouldn't even inspect the repairs after he got through with them. It was only natural for me to send for Nick, who, I knew, would follow me around the world and fly to the moon with me if I had so commanded.

At the same time, I discovered that another Chicago pilot, Roy Ahearn, was joining our outfit and it was merely a matter of asking Nick to get in touch with Roy so both could fly in together. I knew Roy only slightly, a flaxen-haired youngster who was perpetually rebuilding his Liberty 6—Standard with a defiant readiness to exhibit his flying prowess to anyone at anytime.

Ahearn's trip from Chicago to New York, as later related to me by Nick, sounded like a Frank Merriwell and Peck's Bad Boy series of adventures combined. The trip took them eleven days, with all sorts of forced and freak landings and with Nick's twenty dollars spent at the beginning for fuel, they had to stop at every other pasture and pick up some pay passengers in order to move on.

Roy was not very particular how much he charged and, depending upon the affluent appearance of his customers as well as his own stomach, soaked them anywhere from five dollars to a hamburger without the onions. Nick was forever working overtime patching up the wings, fuselage and tail-group so they could hop off again.

One of the craziest incidents of that mad trip, I feel, must be related. It occurred when they were barnstorming near Du Bois, Pennsylvania, one bright June Sunday. A couple of miners, wishing to impress their local friends with their utter fearlessness, loudly clamored for a stunt ride. Spins and loops were about the only stunts known to the average barnstorming pilot in those days.

Roy's Liberty Six motor was equipped with a battery ignition and he naturally had to carry a large storage bat-

(*Continued on page 374*)

Study Aviation *at* Home!

Transport License Texts

THOMPSON AVIATION PUBLISHERS offer a home study course that is the most thorough and practical of any ever written. It will teach you the vital and important facts that serious students, who mean business, want to know.

Worth 20 Times as Much

"I most sincerely want to thank you for the Transport License texts. I had no idea of what was in store for me and you will hardly believe it, but I've paid twenty times as much for the knowledge which they hold. I think all student pilots should have these texts. They certainly will save themselves a lot of money."—*George Stevenson, Prospect St., Smithtown Branch, N. Y.*

Gets Air Corps Commission

"I wish to acknowledge receipt of your supplementing booklet and to state that I believe you are giving a very fine service. It may interest you to know that through the aid of your publications, I was materially assisted in passing the U. S. Government examination for a commission in the Air Corps Reserve."—*M. E. G., N. Carolina.*

This course is arranged in strictly logical and progressive sequence. It is SELF EXAMINING. It not only teaches you but also actually examines you—the same as an instructor would. It contains over 1,600 questions—450 of Bureau of Air Commerce origin, and the rest our coded questions. There are nearly 600 illustrations. Our method of self-examination has never been equalled for assistance to the student, for thoroughness, and for good common sense. The numbers of our coded questions steer you straight to their answers.

These Transport License Texts are studied by Air Line pilots and copilots, and others, down to students. Some of these have held their Transport licenses for years. Many who hold and others who hope to get Airplane and Engine mechanic's licenses, are among our satisfied and successful students.

Our texts have been on the market for five years, and have established a reputation for qualifying students for Bureau of Air Commerce written examinations. It is traditional for our students to pass their written examinations THE FIRST TIME. We sell to the discriminating students of Aviation. They have heard of our system from others who really know what it is all about.

This course is for those who have the equivalent of a high school education, although others have studied it successfully. We have nothing for grammar school pupils.

MAIL COUPON for Price List and Synopsis of Texts

Thompson Aviation Publishers
8322 Woodward Ave. Detroit, Mich.

THOMPSON AVIATION PUBLISHERS, 8322 Woodward Ave., Detroit, Mich.
Please send me, free of charge, a synopsis of your six Transport License Texts—also price list.

Have you ever studied aviation? ..... Age .....

Name .....

Address .....

GAS MODEL BUILDERS

Here's what you've been waiting for . . . a Catalog and Handbook of Accessories for constructing record breaking gas models. Written by champions. Contains gas model hints, photos of champions and their models, success stories of their championship flights. Free—but will appreciate 3c postage for handling.

HEATHE MODEL AIRPLANE CO.
438 - AX5 East 98th St., Brooklyn, N. Y.

BUFFALO PUBLIC LIBRARY
DEPARTMENT OF TECHNOLOGY

Northrop A-17 Attacks

in the new army colors. The government has just purchased 110 of these new attack planes and they promise to be the most formidable of our nation's fighting aircraft and fully the equal of any similar type of plane produced to date.

And, in addition to the covers, there will be a big and pleasant surprise to our photo collectors as well as to our general readers:

A COLORED PHOTOGRAPHIC INSERT ON ENAMELED PAPER

And, as a brand new feature, much in demand by a great number of our readers, both old and young, will be the outstanding first installment of a series of articles:

PLANS AND SPECIFICATIONS FOR A GAS POWERED MODEL

These drawings will be accompanied by a host of photos and a full description of a Rearwin Cabin type gas-driven model that will arouse the greatest interest in the new and absorbing pastime of gas-model building.

20 MORE ARMY INSIGNIA IN COLOR

and a host of other features too numerous to mention in this limited space. The June issue will be an outstanding issue.

Start Your Subscription with the JUNE Issue

POPULAR AVIATION,
608 S. Dearborn St.,
Chicago, Ill.

Gentlemen: I enclose $2.50 for a year's subscription to POPULAR AVIATION. Please send it to the following name and address:

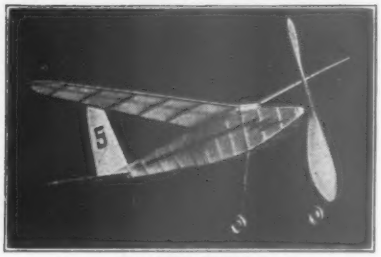
NAME.....

ADDRESS.....

CITY.....STATE.....

BUFFALO PUBLIC LIBRARY
DEPARTMENT OF TECHNOLOGY

• ABOVE ALL •



FOR REAL FLIGHTS
CADET MAJOR, Span 30 In., Area 102 Sq. In.
CADET Jr., Span 20 In., Area 45 Sq. In.

We are proud to present the CADETS. The CADET MAJOR, a fast climbing high altitude soaring airplane with remarkable duration. The CADET Jr., a snappy pursuit style performance airplane with excellent duration. The latest Bunch designs from truly—The Home of Championship Airplanes.

At fields all over the world where Model Builders gather the airplanes flying highest and longest are The Cadets. Hundreds of letters say "The best flyer I have built".—"By far the finest kits I have seen." Give yourself a treat and get these engineering masterpieces.

CADET MAJOR Kit	Postpaid $1.50
CADET Jr., Kit	50c Plus 10c Postage
Both Kits, Postpaid	$2.00

Gas Model Builders! NOTE
These materials are approved by the Bunch Engineering Staff.

	Postpaid
Spark coils, "Hot" Lightweight (2¾ oz.)	$2.00
Spark Plugs, 3/8"—24 Newpointed Electrodes	1.00
Stranded ignition cable, Light and neat, per ft.	.05
Silk for covering 4M, per yd.	.50
Special Nitrate Dope for silk, pt. 60c; qt.	1.00

Catalogue 3c Stamp

BUNCH MODEL AIRPLANE CO.
2303 S. Hoover St., Los Angeles, Calif.

AERO BOOKS
POPULAR AVIATION
608 S. Dearborn St., Chicago, Ill.

Gates Circus

(*Continued from page 372*)

tery of the automobile type. Every time he would loop and hang on top, the battery acid would overflow and trickle down the bottom of the fuselage, eating up his fabric.

On this particular loop, Roy dived from fifteen hundred feet to about eight hundred to pick up speed, pulled heavily back on the stick and the nose commenced to rise quickly. An agonizing groan rose from the gaping crowd below as they saw a large piece of fabric rip off the bottom of the fuselage and separate itself from the plane. As the ship completed the loop and was pulling out of a dive, another large piece detached itself from the ship and when Roy finally leveled off, the crowd below was amazed to see that the tail-group appeared to be held by two thin lines (longerons) and they could see blue sky right through the fuselage of the ship.

After landing, imagine Roy's consternation as the crowd rushed to his transparent fuselage! Nick finally located the broken turtle back and spent two solid days and a good part of the profits getting Roy's ship back in shape to take the air.

The day before the opening of the air show, Charles West, the Gates shop foreman, received an SOS from Trenton, N. J., signed by Roy Ahearn. The message read as follows: "Rush one landing-gear and propeller at once. Find ship cemetery north of town." No one on the field could figure out how Roy happened to crack up 60 miles south off course.

It leaked out later that Roy never believed his compass and would invariably steer by his nose. The crew had no trouble in finding the ship, for half the town was surveying the wreck with its tail sticking up from the tombstones and its nose resting somewhat sadly against a grim granite figure of the Angel Gabriel!

They should have let it rest in peace, but in a few hours the ship was ready for the take-off, and, upon arrival after one brief glance, "Pope" commanded a crew of roustabouts with paint brushes and buckets of red paint to transform it into a Gates circus plane. It required the better part of the night for the job which was done in the Wright hangar, the only hangar on the field.

The night before the opening of the show, it rained furiously and the low meadows, together with the best part of the Teterboro Airport, were flooded. Only a small East and West strip about 100 feet wide by 600 feet long stuck out from the water. The "Pope," after plowing through the muddy road leading to the field and surveying the flooded airport, cursed softly and began to estimate the loss that would have to be taken. His luck was damned. Wasn't this to be the grand and glorious initiation of his outfit to the rich and thickly settled New York and New England area where he had hoped to pick up thousands of dollars?

The prospect for the Greatest New York Air Show was indeed gloomy until about noon. Then the sun broke out and the crowd began to stream along to the airport. By two o'clock more than eight hundred cars were parked on the field and the immediate vicinity. There was nothing but mud, muck and goo, but the show must go on.

"Pope" sent up a half a dozen ships to do individual aerobatics while the remaining ships began carrying passengers, $2.50 for a short ride and $5.00 for a longer one. It actually made little difference whether a customer paid five dollars or two-and-a-half. They were tossed together in the narrow four seats of the Standards and lifted off the ground, circled over the field at a low altitude and deposited again on the narrow strip of dry land on the water-soaked airport. This continued all day long.

EDITOR'S NOTE: *This interesting story will be continued in the June issue.*

THE CARS ROLL UP.

AND THE CABS!

One of the sights of Chicago, if you stop to watch them!

Business men with steamship pasters, European, Asia and Africa stickers on hard-worn luggage! They know of The Stevens, greatest hotel in the world . . . perhaps better than Chicago knows of it.

Debutantes Dainty! The Dinner Crowd and the Top Hatters, to whom life spells whirl and twirl.

Your mood is here . . . flashing in the dining room, banquet hall, or with white turned-back sleepy bed in a high place of quiet.

THE STEVENS CHICAGO
WORLD'S LARGEST HOTEL

ROOM WITH BATH FROM 2.50

ARE YOU INVENTIVE

OTHER MEN have read and profited by our free books, **"Patent Protection,"** and **"Selling Inventions."** Fully explain many interesting points to inventors and illustrate important mechanical principles. With books we also send **free "Evidence of Invention" form.** Prompt service, reasonable fees, deferred payments, thirty-seven years experience. Avoid risk of delay. Write immediately to: **Victor J. Evans & Co., Registered Patent Attorneys, 727-E, Victor Building, Washington, D. C.**

AVIATION PRODUCTS PLEASE ALL FLYERS

Jane Ray, first woman State Aviation Inspector, a satisfied A. P. customer, and her letter. Read it.

CHICAGO GIRLS FLYING CLUB

February 8, 1936.

Aviation Products Co.
619 South Federal Street
Chicago, Illinois

Gentlemen:

We have just received the articles recently ordered and are delighted with them. They are to be used as prizes on our membership drive for the Illinois chapter of the 99ers and the prospect of winning one will have every girl striving her hardest.

The little engine clock is a darling and I want one for myself.

As we intend to have an 'All Women' Air Race in Chicago this summer, we are especially interested in the new trophies you have described to us and if you will advise me, I will be glad to call in the near future to select the prizes for that event.

Sincerely yours,
Jane Ray
Pilot P - 30600
Pres., Chicago Girls' Flying Club
Chairman, Chicago Chapter 99ers

Whether It's a Clock or Plane

That's Why So Many Aviators Boost AVIATION PRODUCTS

Look at these Values FROM OUR NEW CATALOG

SNUGFIT GOGGLES

Here is a good goggle with interchangeable lense, wide vision, sturdy construction. Specially moulded rubber cushions. Easy nose adjustment. Wide elastic head band. Price only **$2.59.** Ask for Snugfits.

WIDE-VISION GOGGLES

with Rubber Mask

You can see in every direction. Built for more angular vision. Non-shatterable lense. Fitted with large soft rubber mask. Ventilated through frame. Ask for Style DEM Goggle. Price only **$4.98.**

Latest Style

PARACHUTE SILK SCARF

Made of genuine white parachute silk, these scarfs are a handsome addition to any flier's wardrobe. Attractive for dress, as well as important part of equipment. Log book given free with each order. Wear a genuine parachute silk scarf this spring. It's the latest style. Price only **$1.98.**

HANDY MECHANIC'S GOGGLES

Great around the shop. Gives adequate eye protection. High quality, non-shatterable lense. Comfortable sponge rubber eye-masks. Used by mechanics, sportsmen, etc. Price only **$2.49.**

Write for Your Copy of the New Aviation Products Supply Catalog Today

Free with your order or send a dime which will be refunded with your first order.

It is chock-full of values. A large selection of helmets, goggles, instruments, gadgets, etc.

Send for it TODAY

FOR THE CAR - CLUB ROOM - OR DEN

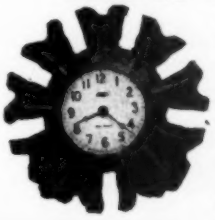
AIRPLANE TYPE AUTO COMPASS

Get this instrument for your car. It's the latest thing. Installed in one minute. Similar to Airplane compass being of the liquid type and having a rotating dial with jeweled pivot. A compensator is also given (not shown) to be placed under this instrument to offset magnetic effect of steel and electrical equipment in your car. Why take the wrong route? Know immediately whether your direction is right or wrong. Priceless on long trips. ORDER ONE TODAY. Price only **$1.98** complete with full instructions.

PROPELLER CLOCK

Electric or wind movement encased in beautifully finished propeller measuring 27 inches. A real ornament. Only **$4.50.**

AIRPLANE MOTOR MODEL CLOCK



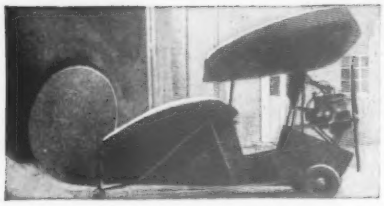
This fine 6-inch model of a 9-cylinder aircraft engine fitted with reliable clock movement made of unbreakable metal with attractive chromium plated exhaust ring. Wind movement or electric movement. Price **$3.95.**

AVIATION PRODUCTS CO.

619 S. Federal St. CHICAGO, ILL.

AVIATION PRODUCTS CO.

Everything for the Aviator



The FLYING FLEA
How To Build and Fly It!

COMPLETE instructions and detailed drawings for building this famous French lightplane. Authentic translation from the French of Henri Mignet, the designer. Profusely illustrated and absorbing book recommended to everyone interested in aviation. Price $3.00 postpaid. Imported from England.

Popular Aviation 608 S. Dearborn St. Chicago, Ill.

FINISHED WACO DELUXE
Parachute Dropping

PAT. APP'L'D FOR

PAT. APP'L'D FOR

WACO YOC, SPAN 26¼", SCALE ¾". A finished model. NOT A KIT. According to a recent survey by a well known model company only two per cent of the kits purchased are ever completed. So in answer to demand TROY presents a series of flying models in the popular three-quarter inch scale equipped with an automatic parachute projector, (patent applied for). The Waco Cabin pictured above has a proportionally scaled man with a parachute. He is placed in the cabin, the door shut, release set and model put in flight. Machine climbs away and at a height of about 30 feet the door is automatically opened and the man thrown out, his parachute opens and he floats safely to the earth. Machine an exact duplicate of the machine built in this city.

Ready to Fly—$3.50

And now TROY offers its Auto-Timer and Parachute Projector, just as used on our finished models, in a complete kit. Three different installations; cabin, cockpit or one which may be placed in 30 seconds and is immediately ready for use. Postpaid, $1.10.

Send Three-Cent stamp for catalog.
Dealers also inquire.

TROY MODEL AIRCRAFT
TROY OHIO

Lewis Plane

(*Continued from page 324*)

The fuselage, tail assembly and rotating wings are all of tubular steel construction, while the parasol wing consists of a wood framework. The landing-gear is a new type of combination spring and hydraulic arrangement.

Equipped for flight, with fuel, pilot and parachute, the Lewis plane weighs about 1700 pounds. It takes off in half the distance and in less than half the time required by conventional planes. The plane flew 100 m.p.h over the airport at an altitude of about 600 feet. At this speed, the engine turns about 1600 r.p.m., while the wings only revolve about 266 r.p.m., or one-sixth of engine speed. According to the builders, these blades are capable of revolving from 250 r.p.m. to 350 r.p.m. and create a positive vertical lift of about 700 pounds.

Each of the revolving blades is about seven feet in length and has a surface of about fifteen square feet. The stable wing is approximately twenty-five feet in length.

Probably, the outstanding result gained from testing the present model, was the discovery that the stable wing or airfoil is unnecessary and that larger rotors, offering more surface to the air on the down stroke, will be more efficient.

It might possibly be wise to revert to the original design of using four rotors, instead of two. A number of other changes are contemplated in building the next plane, the designs of which have already been started. It is planned to have the improved ship ready for flight by about the first of July.

The builders plan to eventually develop their plane to the point where it will take off and land vertically, have a high forward speed, and maneuver with the utmost simplicity. It is also their contention that the improved craft will utilize gravity for the greater part of its forward speed.

END.

Capt. Ball

(*Continued from page 326*)

the officer told Hunter that Captain Ball had been killed. Hunter refused to believe this. On the following day the officer brought Ball's identification disk, and showed it to Hunter as proof of Ball's death. He also told Hunter that Ball had been brought down by anti-aircraft fire, and that his machine was badly wrecked.

A British airman writes as follows:

"I do not know whether the exact manner of his death was ever ascertained. Perhaps the following details may be of interest.

" I was shot down on May 4th (1917) and was a prisoner in Douai. I was with No. 3 Squadron, R.N.A.S., under Colonel Mulock. After I had been in solitary confinement for about a week or less the German Intelligence Officer came to see me, a Bavarian, quite a decent fellow, I have forgotten his name. He asked me whether I knew Captain Ball, as someone's body had been found whom they thought from his decorations might have been Ball. I said yes, as I should have said in any case as I wanted to get a spell outside. But it happened that I had met Ball briefly at Nottingham when he was on leave and I was on week-end leave from Cranwell. He was pretty badly smashed up, but I had no difficulty recognizing him.

"This German officer told me no one had reported shooting down an English machine at that time on that sector of the front, and the conclusion was come to that he had been hit by anti-aircraft guns. He also told me that he was to be buried with military honours."

"As regards the claim of Lothar von Richthofen, it is even questionable whether Lothar was in the air on May 7th. His brother, Manfred, states in his own book 'Der Rote Kampfflieger' that Lothar was shot down on May 5th, two days before Ball's death. A German newspaper even announced that Baron von Richthofen had shot Capt. Ball down—the Baron being on leave at this time.

"The facts seem to point to the anti-aircraft theory, but the truth may possibly never be known."

END.

FREE! WITH ORDERS OF $1 OR MORE

1 DOZ. SHEETS JAP TISSUE or MODEL BUILDER'S KNIFE

Take advantage of this special FREE offer now! Experience what a real pleasure it is to do business with a model airplane supply house that keeps promises! Every order is shipped same day received! All materials are of highest quality! Prove this to yourself! Learn why so many builders, dealers and clubs deal with SKYWAY! Dealers! Send for prices on Balsa wheels with Brass Bearings

18" BALSA SHEETS
1/32x2, 5 for 6c..10 for 10c
1/16x2, 5 for 6c..10 for 12c
3/32x2, 3 for 5c..7 for 10c
⅛x2, 1 for 2c....6 for 8c
3/16x2, 1 for 3c..3 for 7c
¼x2, 1 for 4c....3 for 9c
½x2, 1 for 5c....3 for 14c

BALSA PROP BLOCKS
¼x¾x6, 1 for 1c..6 for 5c
½x¾x5, 1 for 1c..5 for 5c
⅝x1x8, 1 for 2c...3 for 5c
¾x1x8 .....2 for 5c
¾x1¼x12, 1 for 3c 2 for 6c
1x1½x12 .....2 for 11c
1x1½x15 .....1 for 7c

18" BALSA LENGTHS
1/16x1/16 .....85 for 5c
1/16x⅛ .....40 for 5c
1/16x3/16 .....20 for 5c
1/16x¼ .....18 for 5c
3/32x3/32 .....35 for 5c
⅛x⅛ .....30 for 5c
¼x¼ ..... 6 for 5c
¼x½ ..... 4 for 5c
½x½ ..... 2 for 5c

18" BALSA PLANKS
1x1, 2 for..... 9c
1x2, 1 for..... 9c
2x2, 1 for.....16c
2x3, 1 for.....20c
2x6, 1 for.....35c

For 36" lengths double above prices and add 10c postage

Bamboo	Thinner Best	Colored Dope
1/16x12, 40 for 5c	1 oz. 5c	1 oz. 5c
1/16x¼x15 .....6 for 5c	Sheet Celluloid 2x6 ..... 2c	½ pt. 30c
Shredded..40. 5c	6x8 ..... 4c	Clear Cement 1 oz. 5c
Japanese Tissue	12x16 .....15c	½ pt. 30c
All colors, Doz. 16c	Clear Dope 1 oz. .....5c ½ pt. 25c	Wood Veneer 20x30", 1 for 5c 2 for 17c

Reed
1/32, 1/16, ⅛ .....3 ft. 1c

Wooden Wheels
¼", pair 2c
⅜", pair 3c
½", pair 4c
⅝", pair 5c
¾", pair 8c

Celluloid Wheels
¾", pair ... 5c
1", pair ... 7c
1⅜", pair ... 9c
1⅞", pair 15c

Balsa Balloon Wheels
½" ....pr. 2c
¾" ....pr. 3c
1" ....pr. 4c
1⅜" ....pr. 6c
2" ....pr. 8c
3" ....pr. 15c

THRUST BEARINGS 1c
BRUSHES No. 6..5c

MODEL PINS. Lge. & Sml. 5c pkg.
BUSHINGS. doz. 3c
PROP. SHAFTS 2 for 1c
PAUL-O-WINA JAP PROPS 5" .....10c (add 5c per inch for props up to 10".)
Machine Props 5" .....4c (add 1c per in. for props up to 16".)
Rubber Motors 1/16 sq. .20 ft. 5c ⅛ flat ..20 ft. 5c
INSIGNIAS—French, American, English, German 1¼"....4 for 3c 2" .....1c 1 sheet of 24, 5c

Dummy Radial Engines
1½" Diam...15c
1⅝" Diam...20c
3" Diam.....25c
DOWELS. 1/6x12, ...10c per doz.
SPOT WELDED HOLLOW ALUMINUM WHEELS
1" .....pr. 8c
1⅜" .....pr. 11c
1⅞" .....pr. 14c
WASHERS, ¼ and ⅛ .....doz. 1c
SANDPAPER, package 5c
WIRE. 6 ft...3c 36" lengths.
ALUM. LEAF, 2 sheets for 1c
NOSE PLUGS, large..10c doz. small ..5c doz.

Send 3c stamp for "Helpful Hints for Model Builders" and catalog for other bargains. FREE with all orders. ORDERS 75c or under 15c postage. Postage prepaid on orders over 75c. West of Mississippi add 10c extra. Canada add 15% extra. CASH OR MONEY ORDER—NO STAMPS—NO C.O.D.'s.

SKYWAY MODEL AIRCRAFT SUPPLY CO. 393 Seventh Ave., Dept. P Brooklyn, N. Y.

DOUGLAS
70-Horsepower AIR-COOLED ENGINE
MODEL "A" CONVERSION

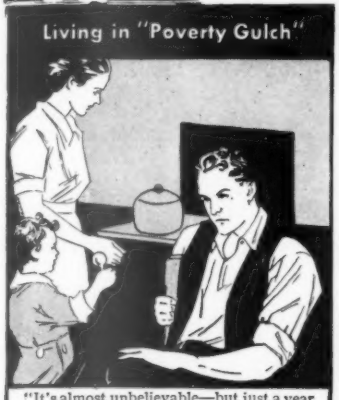
What every lightplane builder has been waiting for. The new Air-cooled Model "A" conversion—70 H. P. Easy to build with DOUGLAS conversion parts. Can be used on Iceboats, Snowsleds, etc. Send 25 cents in coin for information, photo and price list.

DETAILED BLUE PRINTS $3.75

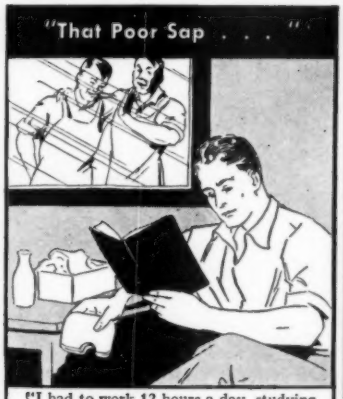
H. Douglas, 936 Madison St., Oak Park, Ill.

Crowds a Lifetime's Progress in 400 Days

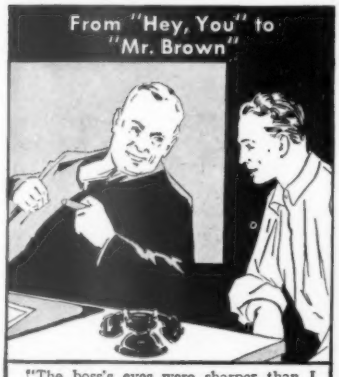
The Amazing But True Story of LaSalle Student Brown's Career



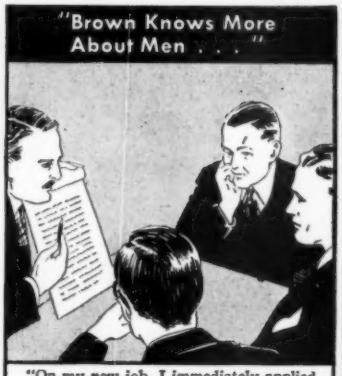
"It's almost unbelievable—but just a year ago, I was living in a little board shack, trying to raise a family on an unskilled man's pay. I decided—since everything else had failed — to try LaSalle home study."



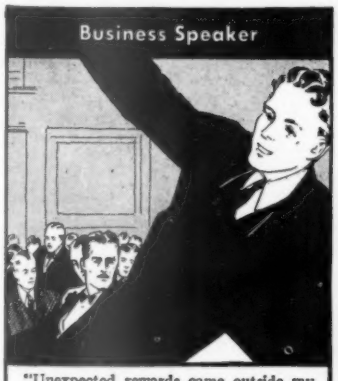
"I had to work 12 hours a day, studying at odd moments. I used to sneak my books to work, sensitive to ridiculing friends. They were the 'poor saps'—for not one of them has since bettered himself in life."



"The boss's eyes were sharper than I reckoned; within five months I was suddenly promoted from 'Hey, you' to 'Mr. Brown' with the title of Night Superintendent—over the heads of men twice as long with the company."



"On my new job, I immediately applied the things I had learned through LaSalle. I organized a maintenance system since adopted by other companies. A director said 'Brown knows more about handling men than any other man in the company'."



"Unexpected rewards came outside my work, as the result of reading that remarkable LaSalle booklet, 'The Second Milestone.' I have been a speaker on business methods, and urged to run for political office. My opinion is sought by men I was afraid to speak to a year ago."

"As I stand in front of my new home, I am proud that in one year I have made what is lifetime progress for many men. Now I'm buckling down to more LaSalle training to meet future opportunities."

How We Build Men

This man's career may seem amazing to you, but to LaSalle it is not so unusual. Along with Brown, thousands of others have, these past years, changed poorly-paid jobs to well-paid positions of honor and trust.

Training some 825,000 men and women has taught us that Success demands three things. If you have all three, not even a major business depression can stop you from getting ahead.

First of all, *training*—the ability to do a job better than the next man. LaSalle home-study training is recognized as a quick way of acquiring such ability. Second, there must be a *Success Plan.* This, LaSalle also supplies —bringing you expert consultation on business and personal problems; helping you overcome handicaps; building confidence . . . speeding you ahead. Third, and this is vital—there must be *ambition;* the courage to stick! Given this, LaSalle can supply all else you need to win success. This coupon is your test—this minute the most important in your life! Why not send it NOW?

LaSalle Extension University

Dept. R-287 **Chicago, Ill.**

Kindly tell me about your Success Plan and training in the business field I have checked below:

- ☐ Higher Accountancy
- ☐ Law
- ☐ Business Management
- ☐ Modern Salesmanship
- ☐ Business Law
- ☐ Business Correspondence
- ☐ Expert Bookkeeping
- ☐ Industrial Management
- ☐ Business English
- ☐ Personnel Management
- ☐ Traffic Management

Name .....

BUFFALO PUBLIC LIBRARY
DEPARTMENT OF TECHNOLOGY

Positio .....

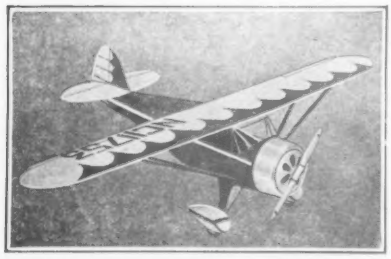
LA SALLE
EXTENSION UNIVERSITY

IT WON'T FLY!

No, this SPECIAL BALSA-CUTTING SCROLL SAW is not intended to skim thru the air like an eagle. But you'll make beautiful models that will, quicker and neater, too. No longer need you use a dangerous razor or knife that splinters your wood and cuts your fingers. Use either hand or motor power. Sturdy, attractive, and really worthwhile. Mail a dollar—we'll send it postpaid.

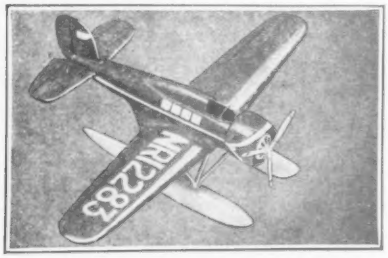
ONLY
CRAFTSMEN ASSOCIATED $1.00
Room 307 COMPLETE
1713 N. Mozart St. Chicago, Ill. POSTPAID

36" RECORD BREAKERS



NEW FLYING MONOCOUPE WITH MOVABLE CONTROLS ! ! !

High as the Stratosphere in quality! A sensation with model builders. A flying model that has broken all records. Accurately designed by our engineers after months of planning. Looks just like a real plane when in the air. Complete Kit contains finished aluminum cowl, carved prop, all supplies, accessories, and the famous HEATHE copyrighted and simplified plans. Be the first to fly this new HEATHE mistress of the skies! $1.00—postage 25c extra. $1.00 Postage 25c Extra



EXACT REPLICA FAMOUS ROGERS-POST LOCKHEED FLYER ! !

You'll want to build this 36" record breaking flyer as a memento! Duplicated in every detail. Each kit contains the famous new HEATHE copyrighted, simplified plans and instruction sheets. All parts printed on balsa. Optional supplies for movable controls from the cockpit, carved prop, finished aluminum cowling, etc., etc. May be flown as a land plane. $1.50—postage 25c extra. $1.50 Postage 25c Extra

FREE PHOTO OF WILL ROGERS & WILEY POST TAKING OFF

You'll want one of these famous photos, size 5x7, suitable for framing. Get yours FREE with a purchase of $1.00 worth of kits. Quantity is limited so rush your order—today. May be purchased (without additional order) for 20c postpaid.

GET ON THIS BAND WAGON!

6-INCH SOLID MODELS
Complete in all respects, plus booklet "3-E-Z Steps to Model Building." Your choice of the following models: Gamma, Spad, Lockheed Vega, S.E.5, Fokker DVII, Boeing P-12-E. 3 for 25c postpaid. 3 for 25c

15-INCH FLYING MODELS WITH MOVABLE CONTROLS
Complete with adjustable pitch prop, etc. Choice of the following: Waco Taperwing, Great Lakes Trainer, Ben Howard's "Ike", Fokker DVII, Northrop Fighter, and Douglas Gull Wing. 2 for 35c postpaid. 2 for 35c

HEATHE MODEL AIRPLANE CO.
438A5 East 98th Street BROOKLYN, N. Y.

Aero Books
POPULAR AVIATION
608 S. Dearborn St., Chicago, Ill.

Bert Hall

(*Continued from page 322*)

formation of two single-seaters and one 2-seater. They lost no time in maneuvering into position to let daylight through the Kentuckian's tough hide. Bert got the first draw and at 20 meters let go a blast at the nearest s.s. A burst of flame from the gas tank told the story.

Bert made his tactical error in getting on the tail of the 2-seater. That boy in the rear cockpit had a cool head, a steady hand and a deadly eye. He trained his gun square on Bert's nose and let 'er go! Bert's next sensation was that of suddenly finding himself in pitchy darkness. His fists held to the trigger but he was firing wildly—blindly. In a few seconds his bloody face and a terrific stabbing of pain in his neck told him what had happened. He had been shot in the mouth!

Forgetting Germans and everything else, Bert's one thought was to get home before he bled to death. That worried him more than anything else—even a possible *coup de grace* from his enemy. He was unmolested, however, and learned on arrival that a bullet had passed through his cheek, exiting from his neck and bowling over half his teeth! Not, as it happened, a serious wound, but a painful and embarrassing one!

The French army dentists made him up a fancy set of teeth—but while they were engaged in their labors, Bert was up and at 'em again.

The moral of that "incident"—recited for the benefit of you future dog fighters is: don't ride the tail of a 2-seater unless you know the observer is asleep!

Every bullet hole in the planes Bert Hall flew was neatly patched with dollar signs—like this: $ $ $. The quaint practice grew out of a party Bert was on in Paris. Seated near his group was the beautiful spy, Mata-Hari. There were whispers of her espionage work but no proofs—as yet. A friend from Bert's table went over and told the spy that Bert was the son of a great American banker and back in the United States wore clothes with dollar marks all over them.

The work of the doughty boy from Bowling Green came to the attention of the military bigwigs in Paris. He was summoned, handed a passport and told to go to Russia. Object: to bolster the morale of various Russian flying units.

Early in 1917 Bert arrived by devious routes in the land of the Tartar and the Don Cossack. The bloody head of the great Russian Bear was bowed from the superhuman blows dealt it by its enemies. The people of the world's largest nation were discouraged and rebellious. Revolution was in the air. A great change in government was being engineered beneath the political tides.

Bert watched bread riots, observed starving children and saw the handwriting on the wall. When the revolution broke he was well on his way from bloody scenes of the army in mutiny and a great people torn by civil dissension.

Refused exit through Sweden, Bert sought the aid of Ambassador Francis of the United States. Partly through him and partly through wit and good luck, Bert got passage on the Trans-Siberian railway. For 18 miserable days and nights he traveled across the steppes of Russia and the snow swept barren wastelands of bleak Siberia. He arrived hungry and disgusted in Shanghai.

It was his first glimpse of the Far East. As we know from our newspapers, it was not to be his last. Whether he was impressed by the land of the mandarins or whether that war torn country merely offered another opportunity for travel and adventure, only Bert himself knows.

After visiting America once more to aid in some of the many war campaigns here, and testifying before a Congressional aviation committee, Bert went back to France. In a few short months the greatest war the world had ever seen was ended. Bert was once more at a loose end. He tried all manner of ventures, chiefly concerned with aviation. Then trouble in China began to take on a serious face. Manchus and mandarins seemed to call him. Anyway, he proved a big help.

As General Chan of the Nationalist army, Bert whipped into shape an air service based on the organization and fighting technique of the Lafayette Escadrille and, in fact, the whole French army. And Bert had plenty of experience to draw from.

His fame began to spread. A newspaper correspondent with a good nose for news got wind of the true identity of "General Chan." It was great stuff for the press and people enjoyed reading it. And when Jack Holt, the motion picture actor (or wasn't it necessary to add that?) made a picture based on Bert's Chinese alias, it made a corking yarn and probably was tame by comparison with some of his real experiences which, we understand, Bert is holding out to tell about in a new book.

END.

FUTURE FLYERS OF AMERICA!

● Write me for complete information on how to join the Future Flyers of America—a live and growing organization of future men of the air!
KEEP UP TO DATE—INFORMATION ON REQUEST. GIVE AGE.
PILOT JOHN W. HUFF, 926 N. BLVD., OAK PARK, ILL.

Transports

(*Continued from page* 334)

In 1932 night flying operations and services were extended and schedules were generally speeded up. Bellanca offered the 12-15 place Airbus, and the Ford 16 place model 5-D went into regular service on the airlines. The reliable Stinson model U trimotor, an 11 place high-wing monoplane was made available, as was the 7 place Lockheed DL-1. In addition, the Curtiss-Wright organization developed an improved transport, the T-32, from the older Curtiss Condor.

The greatest event of this period was the acceptance by Pan American Airways of the Sikorsky-S-40. This ship is the largest amphibian ever built. A monoplane amphibian of the same general type as the other Sikorsky amphibians, the S-40 carries thirty-eight passengers in addition to a cargo of mail, and powered with four Hornet engines it has a top speed of better than 130 m.p.h. and a cruising range of some 500 miles.

The years of 1933 and 1934 brought some of the greatest advancements ever made in commercial aviation. Speeds of from 150 to 200 miles an hour were an accepted thing and all transport planes of the period showed a high degree of refinement in streamlining and an improvement in stability that was undreamed of five years before.

In the field of the smaller transport, Stinson brought out a ten passenger low-wing tri-motor, while Lockheed brought out the 12 place Electra, a low-wing monoplane job powered with two Pratt & Whitney Wasp Juniors. General Aviation offered the GA-43, a ten-place monoplane fitted with a single Wright Cyclone, and Bellanca offered an improved version of the Airbus in the Aircruiser.

During the early part of 1933 the Boeing 247 was placed on the routes of United Air Lines and for a year no plane could equal its speed, efficiency, and comfort. Then, in the early part of the year 1934 American Airlines placed the much improved Curtiss-Wright Condor on their routes and a real race for superior equipment began as Eastern Airways placed the new Douglas transport in service in their system. In addition to securing the later developed Vultee, American Airlines, now contracted for the new Douglas ships, as did Transcontinental & Western Air. To combat this competition, the Boeing 247 was improved and the 247-D resulted. These planes are still just about the last word in commercial transportation.

The Boeing 247-D is an all-metal semi-monocoque monoplane powered with two 550 h.p. supercharged and geared Wasp engines fitted with three-bladed controllable pitch propellers. In addition to ten passengers, the craft carries a crew of three and a cargo of mail and baggage.

The Douglas D.C. transports are the result of long and careful scientific aeronautical research. Powered with either two P & W Hornets or two Wright Cyclones, the ships represent an outstanding achievement in the field of commercial transportation. Like the Boeing 247-D's, the Douglas ships are low-wing monoplanes with retractable landing gears.

The last of this triad of fast transport monoplanes is the Vultee. Although this craft is a low-wing, all-metal monoplane as are the Douglas and Boeing, the Vultee is unlike them in that it is powered with a single engine. Fitted with a Wright F-2 Cyclone, the ship attains a speed of 235 m.p.h. with its full load of eight passengers, two pilots, and 340 pounds of mail and baggage. Due to its

MR. DEALER!

LET'S GET DOWN TO BRASS TACKS!

If 18" lengths are desired, take ½ of 36" length price.
If 2" widths are desired, double price of 2" widths sheet Balsa. Thinner same price as clear dope.

BALSA 36" LENGTHS PER 100

1/32x1/16	10c
1/16x1/16	10c
1/16x3/32	18c
1/16x1/8	19c
1/16x3/16	24c
1/16x1/4	26c
1/6x1/2	60c
3/32x3/32	24c
1/8x1/8	29c
1/8x3/16	48c
1/8x1/4	52c
3/16x3/16	65c
1/4x1/4	80c
1/4x1/2	$1.50
1/2x1/2	2.15

36" PLANS

Scale craft flyer plans with movable controls: Post-Rogers Lockheed or the Monocoupe, $1.00 per doz. or $6.00 per hundred.

36" SHEETS

1/64x3	10 for 14c
1/32x2	10 for 14c
1/16x2	10 for 17c
3/32x2	10 for 20c
1/8x2	10 for 22c
3/16x2	10 for 31c
1/4x2	10 for 40c

BALSA PLANKS 36" Lengths

1x1, each	6c
1x1½, each	8c
1x2, each	15c
1x3, each	20c
1x6, each	35c
1½x1½, each	25c
2x2, each	25c
2x3, each	35c
2x4, each	45c
2x6, each	60c
3x6, each	$1.25

COLORLESS CEMENT

1-oz. bots., ½ doz.	23c
2-oz. bots., ½ doz.	40c
4-oz. bots., ½ doz.	70c
1 pt., each	45c
1 qt., each	75c
1 gallon, each	$2.00

CLEAR DOPE OR BANANA OIL

1-oz. bots., ½ doz.	23c
2-oz. bots., ½ doz.	40c
4-oz. bots., ½ doz.	70c
1 pt., each	40c
1 qt., each	65c
1 gal., each	$1.75

Thinner same price as clear dope.

JAPANESE TISSUE

White, per doz.	12c
Colored, asst., per doz.	15c
All colors. Silver, per doz.	21c

You sell airplane supplies in order to make money. The House of Diamond is in business to help you make money. We give you the finest quality possible and we endeavor to sell at the lowest possible wholesale price. In addition we give you the fastest service in the business. There may be occasions when a competitor may undersell us on individual items to the extent of a penny or two—but do not let such trifles blind you to the fact that Diamond gives you WHAT you want when you want it. Diamond will never sacrifice quality in order to create a false "bargain". Buy from Diamond, the House of Reliability. Send for our new 1936 Catalog which is just off the press.

STANDARD PITCH BALSA PROPELLER BLOCKS Per Dozen

⅜x½x5	5c
½x¾x5	5c
½x¾x6	6c
¾x1x7	18c
⅞x1x9	25c
¾ x1¼x10	30c
¾x1¼x12	35c
1x1½x12	40c
1x1½x15	55c

BAMBOO

1/16 sq. x 14, 1 gross for	20c
1/16x¼x11, 1 doz. for	5c

REED

1/32 or 1/16 dia., 50 ft. for	18c
3/32 or ⅛ dia., 50 ft. for	20c

ALUMINUM COWLING Closed or Open

1½" dia., 3 for	25c
2" dia., 3 for	35c
2½" dia., 3 for	43c
3" dia., 3 for	55c
4" dia., 3 for	80c

FRESH PARA RUBBER AAA GRADE

Per 225' skein

1/32 sq.	25c
.045 sq.	35c
3/32 flat	35c
1/8 flat	40c
3/16 flat	70c
Lb., any size	$1.00

DOWELS

1/16" dia. x 12", 100 for	55c
25 for	20c
⅛" dia. x 36", 100 for	$1.50
25 for	45c
3/16" dia. x 36", 100 for	$2.25
25 for	75c
¼" dia. x 36", 100 for	$3.00
25 for	1.00

SHEET CELLULOID (Transparent)

12½x16, each	19c
6x8, doz.	65c

INSIGNIA SHEET

12 pr. & rudder and tail markings with gummed back. Doz., 36c; 100, $1.75

DUMMY RADIAL ENGINES (Celluloid, 9 cylinders)

1½" dia., ½ doz. for	80c
2" dia., 3 for	65c
3" dia., 3 for	85c

3" DIA. CELLULOID MOTOR AND DRAG RING COMBINED (First time on market.)

Special price, 3 for $1.00

NOSEBLOCKS, HARDWOOD

1 doz.	5c
100	40c

CELLULOID WHEELS

¾" dia., per doz.	24c
1" dia., per doz.	25c
1⅛" dia., per doz.	35c
1⅞" dia., per doz.	60c

BALSA BALLOON WHEELS (Machine Turned)

½" dia., per doz.	9c
¾" dia., per doz.	11c
1" dia., per doz.	14c
1¼" dia., per doz.	19c
1⅞" dia., per doz.	38c
3" dia., per doz.	85c

BIRCH WHEELS LIGHT AND STRONG

½" per doz.	5c
⅝" per doz.	6c
1" per doz.	8c
1⅜" per doz.	10c
1⅞" per doz.	15c

BRASS BUSHINGS OR EYELETS Per 100

1/16 diam.	12c
3/32 diam.	15c
1/8 diam.	18c

THRUST BEARINGS (Hard Steel)

Small, per dozen	6c
Small, per gross	55c
Large, per dozen	7c
Large, per gross	70c

WASHERS PER 100

⅛ brass O. D.	5c
¼ copper O. D.	5c

WIRE PER 100 FT. (Straight Lengths)

No. 6	15c
No. 8	18c
No. 10	20c
No. 12	23c
No. 14	26c

SHEET ALUMINUM Per 5 ft.

.002 thick	35c
.005 thick	50c
.010 thick	75c

ALUMINUM TUBING (Special 1/100" wall)

1/16 O.D., 5 ft.	30c
3/32 O.D., 5 ft.	32c
1/8 O.D., 5 ft.	32c
3/16 O.D., 5 ft.	40c
1/4 O.D., 5 ft.	45c

COLORED DOPE

White, yellow, orange, blue, red green, olive, drab, black, silver, gold or gray.

1-oz. bottles, per ½ doz.	30c
2-oz. bottles, per ½ doz.	55c
4-oz. bottles, per ½ doz.	$1.00
1 pt. each	50c
1 qt. each	85c
1 gallon, each	$2.25

SANDPAPER

5 Pieces to the Pack
Per doz. pkgs. 25c

HIGH GLOSS

To shine up colored models.

1-oz. bottles, per ½ doz.	30c
2-oz. bottles, per ½ doz.	55c
4-oz. bottles, ½ doz.	$1.00

CELLULOID PANTS

For ¾" or 1" wheels, ½ doz.	30c
For 1⅜" or 1⅞" wheels, ½ doz.	75c

¾ FINISHED BALSA WHEEL PANTS

Ready for final sanding

To fit:	6 pr.
½" wheels	36c
¾" wheels	36c
1" wheels	36c
1⅜" wheels	54c
1⅞" wheels	54c

PROP SHAFTS (Hard Steel) One size fits all models

Per dozen	10c
Per gross	75c

REAR HOOKS (Hard Steel) One size fits all models

Per dozen	10c
Per gross	75c

DIE-CAST BOMBS

¾" long, 3 for	10c
1¼" long, 3 for	20c
3" long, 3 for	35c

PURSUIT or SWIVEL MACHINE GUNS (DIE CAST)

¾" long, 3 for	10c
1" long, 3 for	15c
1¾" long, 3 for	25c

2-BLADED PROPS (DIE CAST)

1½" long, 3 for	20c
2½" long, 3 for	35c
3½" long, 3 for	45c
4½" long, 3 for	55c

3-BLADED PROPS (DIE CAST)

1½" long, 3 for	25c
2½" long, 3 for	35c
3½" long, 3 for	50c
4½" long, 3 for	60c

DIE-CAST WING AND TAIL LIGHTS

3 Pcs. to a Set

For 12" model, 3 sets	20c
For 15" model, 3 sets	40c
For 24" model, 3 sets	60c

MODEL PINS

Per doz. pkgs. 35c

MACHINE CUT PROPS

5" per doz.	30c
6" per doz.	38c
7" per doz.	48c
8" per doz.	50c
10" per doz.	85c
12" per doz.	$1.00

WOOD VENEER (For scale model work)

20"x30", 3 sheets for 25c

GENUINE SUPER-FINE TISSUE

(Cover your champion endurance ships with this paper.)

18x24, per doz. 75c

ALUMINUM LEAF

.0003 of an inch thick, 3½" wide, 100 ft. for 35c

FRESH RUBBER A GRADE

3/32 flat, skein 250 ft.	20c
⅛ flat, skein 250 ft.	25c

FREE DEAL

A Big Bonus for a Limited Time Only!

With each order for $2.50 or more of supplies we give free skein of para rubber; regular wholesale price 40c; retail value $1.40 FREE! With each order for $5.00 or more of supplies we give Free—1 skein of para rubber and 2 dozen large insignia sheets. Wholesale price $1.17; retail value about $4.00.

FREE CATALOG

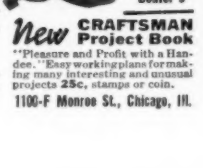
Just off the Press! Listing everything and anything you may need in model airplane kits and supplies. Everything at rock bottom prices. Get yours today.

HOW TO ORDER

No orders under $2.50 . . . all orders shipped express collect at these low prices.

DIAMOND
Model Mfg. Supply Co.
915 A5 Saratoga Av. Brooklyn, N. Y.

HANDEE
Tool of 1001 Uses



Does away with slow hand work. Plugs in any light socket, A. C. or D. C. 110 v. 13,000 r. p. m. For home, shop or take to job. Uses 200 different accessories . . grinds . . polishes . . routs . . drills . . cuts . . carves . . sands . . saws . . sharpens . . engraves. Order on our Ten-Day Money-back Trial . . . or send for FREE Catalog.

$10.75

And up Postpaid, 3 accessories FREE. Send order today.

Chicago Wheel & Mfg. Co., 1100-F Monroe St., Chicago, Ill.

See at your Dealer's

New CRAFTSMAN Project Book

"Pleasure and Profit with a Handee." "Easy working plans for making many interesting and unusual projects 25c, stamps or coin.

special construction, the cabin of this craft is quieter than a Pullman car.

One of the most interesting of the present day transports is the Curtiss-Wright Condor convertible sleeper. This job is a development of the T-32 and the old Curtiss Condor and it is powered with two Wright Cyclones developing 1430 h.p. The craft carries twelve passengers and two pilots and can do 165 m.p.h. "Flying Pullmans" in every sense of the word, these ships are divided into six sections, each of which is convertible into an upper and lower berth. These berths are a full inch longer than those on the standard railroad sleeper and when not made up they become roomy club chairs.

In the field of over-water flying, Pan American Airways, in conjunction with Igor Sikorsky and Glenn Martin placed giant new seaplanes on their routes. These craft at once broke all existing world records for seaplane transportation.

The first of these flying boats is the now famous Sikorsky S-42 which has been described in a previous issue of POPULAR AVIATION. First placed in use on the long distance North to South America mail routes, the S-42 later trail blazed Pan American's trans-Pacific route and the craft will be used regularly when passenger service is opened.

The Martin flying boats are the world's largest air liners. Designed to make the longer hops on the Pacific division of the Pan American System, these craft weigh 25 tons and can carry 50 passengers. On the trans-Pacific flights they will transport fourteen passengers, its full crew, and a ton of mail and cargo at a speed of 2½ miles a minute for 3000 miles non-stop. The Martin boats are parasol monoplanes with four P & W engines faired into the leading edge of the wing. The hull of the boat is well streamlined and the navigating and pilot's compartment is well faired into the general hull assembly with the result that parasitic resistance is reduced to a minimum.

The past year of 1935 is important for the fact that commercial transportation was improved generally and the first flights were made and final preparations completed on the trans-Pacific route to the Orient. In addition to this, two outstanding transports, the Fairchild Baby Clipper and the Sikorsky S-43 were brought out.

The Fairchild Baby Clipper is the largest and fastest single engine amphibian in the world and it was designed for Pan American for use on their river routes in South America. Powered with either the 670 h.p. Wright Cyclone or the 650 h.p. P & W Hornet, the craft carries eight passengers, a crew of two, and a load of 1000 pounds of mail and express at a high speed of 179 m.p.h. and a cruising speed of 158 m.p.h.

The Sikorsky S-43 was designed for the Inter-Island Airways of Hawaii and they are used for mail and passenger service in the Hawaiian Islands. The general design of the S-43 differs from the usual Sikorsky treatment of the amphibian design in that the hull is of conventional flying boat design with the tail surfaces mounted at the rear instead of the short hull with the control surfaces mounted high to the rear on out riggers.

The early part of 1936 will witness the introduction by the American Airlines of the new Douglas DST flying sleeper. This craft is a development of the Douglas D.C.'s and are quite similar in appearance, being all-metal, low-wing monoplanes. They will be fitted with sixteen large, roomy berths, dressing rooms, lavatories, and every possible convenience for the comfort of both passengers and pilots. The DST will cruise at 190 m.p.h. on but 70% of its available power. Power will be supplied by two 1000 h.p. Wright Cyclones.

It is probable that 1936 will not bring the building of any larger transports, but there is certain to be a refining of existing designs. Of course there is talk of a giant four engine Boeing transport, but as yet nothing official or definite has been released. It is certain that the sleeper plane will gain in popularity during the year, and the linking of the Pacific route with the domestic air lines will make for all around improved air transportation in this country.

END.

Are you going to take advantage of this—
YES, YOU CAN GET A JOB IF YOU TRAIN AT CURTISS-WRIGHT
SPECIALIZED PRACTICAL TRAINING IN AERONAUTICAL ENGINEERING AND MASTER MECHANICS. (THIS COURSE INCLUDES COMPLETE AIRCRAFT METAL TRAINING).
CURTISS-WRIGHT TECHNICAL INSTITUTE
GRAND CENTRAL AIR TERMINAL, GLENDALE, CAL.
NAME
ADDRESS
Age
Aeronautical Engineering
Master Mechanics
Home Study
Aero-Drafting
Date I plan to enroll 19
Opportunity Knocks
Send the coupon today for complete information.
DOUGLAS AIRCRAFT COMPANY
December 28, 1935
Major C. C. Moseley
Curtiss-Wright Technical Institute
of Aeronautics
Grand Central Air Terminal
Glendale, California
Dear Major Moseley
Recent contracts awarded our Company added to military and commercial contracts already on hand are forcing a rapid expansion of our personnel and a stepping up of our production for at least two years. Thousands of trained aircraft men, especially sheet metal workers will have to be added to our payrolls
During the past several years, we have employed a large number of your graduates and found them eminently satisfactory Will you please advise how many graduates you will have available monthly, beginning this summer and for the next eighteen months thereafter?
Efficient workmen capable of working with the care and precision demanded by our Company are difficult to find. You are to be congratulated on the fine job your Institute is doing in turning out such men
Yours very truly
D W Douglas
President
DWD.RK
CURTISS-WRIGHT TECHNICAL INSTITUTE
GRAND CENTRAL AIR TERMINAL, GLENDALE, CAL.
Major C. C. MOSLEY
PRESIDENT

BUFFALO PUBLIC LIBRARY
DEPARTMENT OF TECHNOLOGY

Old Baldy

(*Continued from page 366*)

I climbed the ship several hundred feet above Baldy and then flew a few hundred feet up the canon, poked the ship's nose down until the air speed read a hundred and sixty miles an hour, leveled out—skidded—a shot—and we pulled over into a hammer-head stall and fell out in a long sweeping wing-over.

Coming out of the wing-over, I managed to do what I had planned. I flew under the bird, just clearing the ground and Bill got a good shot at Baldy's unprotected under-body. Baldy dropped. Although I heaved a sigh of relief I almost hated to see his huge body fall to the canon floor. A swirl of brown feathers drifted after him like a last salute from a gallant enemy.

I took time out to wipe the dew from my goggles and we dropped down to make sure of results. A jumbled mass of feathers on the rocks below told us the sum total. "Old Baldy" had killed his last lamb.

But, when I thought of how close we came to chipping little pebbles from that big pile of rocks, I shivered. We had missed that six hundred foot cliff by not more than three feet, while traveling over a hundred miles an hour. I wouldn't hunt eagles again for all the bounty money in Texas.

END.

Pou du Ciel

(*Continued from page 340*)

chute, and that I had combined the curve formed by the approximation of both wings with their dihedral to thus spill air on all sides. With the motor cut, the advancement was nil, and I made a vertical descent at about ten meters per second.

I was fortunate enough to witness one of France's crack test pilots take up the "Pou" with orders to wreck it. He did everything he knew, but finally came down with a new respect in his eyes. The Government services were then forced to pass on the plane, and it is now recognized in France and proudly carries its F on its tail just like its bigger brothers.

I hope I have been able to convey a bit of my enthusiasm for this little plane and the man that conceived it. Knowing that he gave the greater part of his life to realize his dream—that he experimented on OVER TWENTY DIFFERENT MODELS, built, tore down, planned, built, tore down—all this on an income of not more than $1500 a year, then we may appreciate Henri Mignet as one of the pioneers of aviation who will prove to Americans as he has proved to his own countrymen, that he has one of the best solutions for a popular, safe, inexpensive flying machine.

END.

Training Pilots

(*Continued from page 332*)

been in the west sector, the 90 degree turn would have brought you into an "N" zone. In either case, a 270 degree turn to the left will bring you back on the equi-signal zone and lead you to the beacon. This same method is carried out for all the sectors. When the beacon is reached, a "cone of silence" in which all signals fade out will be found immediately over it.

You now approach the field as if for a blind landing until you are down to 200 or 300 feet. The inspector will now let you raise your hood and the test is over.

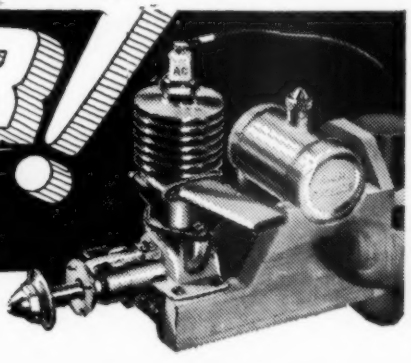
This, while it may seem simple while reading in your arm-chair, is really the most difficult test that the pilot must face. He heaves a sigh of real relief when it is all over.

The importance of these tests cannot be overestimated. The pilot of a large transport is probably faced with greater responsibility than a man in any other profession. He has about fifty thousand dollars worth of property and perhaps a dozen or more lives entirely dependent upon his judgment and skill. The slightest error would prove disastrous. There is an old saying that an aviator makes but one mistake.

END.

Now MORE POWER!

More Efficiency..Less Vibration



Important refinements which make the "Baby Cyclone" Engine more outstanding than ever have been engineered into the new 1936 Model which is now in large scale production and ready for *immediate delivery.*

New counterbalanced crank shaft gives more power, with minimum of vibration—a better balanced engine assuring trouble-free extra-long life.

New interchangeable needle valve assembly—for better carburetion and finer adjustment.

Increased number of fins on the cylinder results in unbelievable cool operation hour after hour.

Performance makes the "Baby Cyclone" Engine the one outstanding foolproof power plant for model builders. Despite these new improvements the price of "Baby Cyclone" Engines remains the same, $15.75. Order yours today. Send the coupon below.

NEW CALIFORNIA CHIEF KIT

Now available—this simple thoroughly tested high-wing model designed especially for the "Baby Cyclone." Completed plane has 61" span, 42" overall length and 13" height, weighs 2¼ pounds with engine. Includes assembled landing gear with 3½" air wheels, cut-to-shape fuselage and tail surfaces; shaped, notched and sanded ribs; silk for covering, dope, cement, glue, etc., and full size scale drawing with simple instructions. Easy to assemble in one day—$7.90 complete, prepaid.

BRIEF SPECIFICATIONS

TYPE—1/6 h.p. rotary valve 2 cycle, ¾" bore, 13/16" stroke. Variable speed from 500 to 4000 r.p.m. with 13" prop. 1¾ oz. capacity gas tank. IGNITION—Special A-C pointed plug, 2 oz. coil, foolproof timer. SIZE—3¼" deep x 1⅞" wide x 4¼" high. WEIGHT—Including engine, tank, coil and condenser 10½ oz. Engine shipped on wood base after actual factory run-in test.

The New Improved 1936 "BABY CYCLONE" ENGINE

AMCRAFT INDUSTRIES, Grand Central Air Terminal, Glendale, Los Angeles, California.
I enclose P.O. money order for which please send me prepaid

- ☐ One "Baby Cyclone" engine at $15.75
- ☐ One "California Chief" kit at $7.90
- ☐ One 13 inch highly polished mahogany propeller specially engineered for the "Baby Cyclone" engine, $1.50
- ☐ One each engine, kit and propeller, $25.15

Name.....
Address.....
City and State.....

Advertise in this Directory.

BUYER'S DIRECTORY

Rates: $5.00 per inch.

AIRPLANES FOR SALE

New Aeroplanes Only $25.00

down. The famous 98 Trainer, one and two-place, equipped with 700-4 Air Wheels, welded steel fuselage $98.00 each and up. Can be powered with Ford, Szekely, any motor weighing 250 pounds or less. Propellers $2.98 up; 40 h.p. motor $49.98; 700 Air Wheels, including hubs, $16.00 per set. Send 25c for more information and easy payment plan.

UNIVERSAL AIRCRAFT CO., FT. WORTH, TEXAS
Dept. I

For Sale: Easy pmts. to suit.
2 OX Eaglerocks.
1 Barling NB-3, low wing with Genet.
1 Sport 2 pl. biplane, and 1 cracked Eaglet.
Wanted: Light planes, parts, instruments, a parachute, metal lathe and other shop tools, motors 20 to 100 H.P. Will trade planes or Cash.
Send dime for bargain sheet and Skeeter Plane news with plans for Flying Flea.

ROY P. FRY, HOOD RIVER, OREG.

AIRPLANE ENGINES

AIR-COOLED CONVERSION ENGINES

Built from Ford "T" and "A" blocks, using regular cylinders, water jackets being removed.

We furnish special air-cooled, aluminum alloy, high compression cylinder heads, fins for cylinders and other parts.

We now have ready, a set of illustrated plans on the model "T", which will be sent postpaid for 50c. "A" plans will soon be ready.

SESSIONS AIRCRAFT COMPANY
Waynesville, Illinois

AIRPLANE PARTS AND PLANS

FREE **FLYING FLEA** *FREE*

Return this ad and $2.50 for the complete set of large detailed blueprints, full size wing curve, fittings shown full size and receive a complete set of built-up ribs for the Flying Fleas Rudder, ready to slip on the spars. Money refunded if not satisfied. Rush your order now. Three view drawing of Flea showing all principal dimensions, prices, etc. Two Dimes.

KAMM AIRCRAFT CO., 524-12th St., Oshkosh, Wis.

Professional Blueprints and Factory Built Parts Get Results

FLYING FLEA

The original ship has flown the 2000 mile circuit of France, crossed the English channel. Notable flights by Allenby in England. Nirmaier at Miami Air Races in U. S. Over 100 now being built in this country. All experts agree it is the ideal amateur ship. With our Kits it is easy to build. Requires very few tools and small shop space.

5 Sheets of Blueprints and Drawings. Wing curve is full size, for convenience in building ribs. Nothing smaller than ⅛ full size. Complete enough to make every part from raw material if you like. The complete set, $2.50. Any sheet sold separately for 50 cents.

PARTS KIT

Requires less work to assemble than any kit ever sold. The hard work is done in the factory with machinery, saving you all the trouble. Avoids waste on account of spoiled material, mistakes in cutting, etc. No group costs over $8.40, most of them lots less. For example: tail wheels 65 cents per pair, main landing axle $1.50, 24x4 straight side wheels $2 ea. Tires $2.75 ea. Control pullies 10c ea. Stranded and flexible cable for flying and control wires, enough for all, $3. Welded controls with joystick, rockershaft and outside horns, $3.50. Welded rudder post and tail wheel axle, $2.50. Cabane struts with attaching plates, $3.50. Used converted Heath Henderson motor with mag and deep oil sump, copper tipped propeller and welded steel tube engine mount, $50.

Illustrated Circular and Price List, 10c.

SUPERFLEA AIRCRAFT Lawrence, Kansas

ALUMINUM ALLOY PISTONS

Newest type T-Slot Pistons fitted with best quality wrist pins and oil and compression rings. Standard or oversize.

FORD A & B, CHEVROLET AND PLYMOUTH 4 (set of 4) ..... $ 6.00
CHEVROLET 6 AND ESSEX 6.... 10.00 (Set of 6)
FORD V-8 AND PLYMOUTH 6.... 12.00 (Set of 8 or 6)

Cam ground Pistons slightly higher. Pistons for other 2 and 4 cycle motors priced low. Specify make, model, and oversize wanted. Include deposit with order; balance C.O.D.

BAUM ALUMINUM, 1709 Gillingham St. Philadelphia, Pa.

PROPELLERS

PROPELLERS OF DISTINCTION—These laminated propellers are the most efficient made, regardless of name, make, or price. Order from this ad, cash with order.

4' for Harley and Indian motors	$ 3.50
4' 6" Heath-Henderson, metal tipped	7.65
6' Fords, Lawrence, Anzani, metal tipped	9.98
8' for OX-5, hardwood, copper tipped	16.98
MOTORS: 40 H.P. motors, rebuilt like new	49.98
SHIPS: Famous 98 Trainer, Single Place	98.00
TIRES: 7.00-4 Air Wheels, including hubs	16.00
Information, incl. leather-bound flying manual	.25

UNIVERSAL AIRCRAFT CO., Dept. I, Ft. Worth, Tex.

LORENZEN PROPELLERS
Are Made To Meet The U. S. Government Specifications

Why not fly with the BEST and enjoy safe flying?
Cheap propellers are dangerous. Why take a chance?
Rush a dime for our Enlarged and Newly Illustrated Catalog.

Lorenzen Propeller Company
Dept. P.A. Niles, Michigan

BENNETT PROPELLERS

Guaranteed 25% better performance, 25% lower in price and extra high in quality. Propellers for all aircraft engines including the Brown Junior model. Write for list today.

Bennett Propeller Co., Morganton, N. C.

BOOKS

LIGHTPLANE DESIGN

The Fact-Book for the Home-Builder
APPROVED BY EXPERTS
Sold With a Money-Back Guarantee
WRITE FOR FREE LITERATURE
WALTER H. KOFFF, Aeronautical Engineer
Box 4 - HIGHLAND PARK DETROIT, MICHIGAN

AERO BLUE BOOK

For 1936 gives specifications of over 300 airplanes ranging from 20 to 7000 h.p. and nearly 100 aero engines; appraised value of many second hand planes; valuable points on buying used planes; data on choosing a flying school. Only information of its kind ever compiled. Priceless to students, engineers, dealers and flyers. Send $1 (money order, check or currency.)

AIRCRAFT DISTRIBUTING CO. Dept. 5-PA
1480 Arcade Bldg., St. Louis, Mo. $1.00 Postpaid

DO YOU WANT TO KNOW MORE ABOUT HOW THE ARMY TRAINS PILOTS?

My new book—"Wings Over Texas"—will take you thru the day by day thrills, spills, and laughs that go into the making of an Air Corps Pilot. Hundreds of readers of this magazine are eligible for appointment to Randolph Field. My book tells you how to apply—and what to expect if you are accepted. $1.69 postpaid.

T. S. Terrill, 2028 Beachwood Dr., Hollywood, Calif.

Aviation Books

Complete Stock of Books on All Aviation Subjects.
Send for Catalog.

GOODHEART-WILLCOX
2009 So. Michigan Ave., P.A. 5, Chicago, Ill.

INSTRUCTION

Get your start in the fast-growing
COMMERCIAL AVIATION INDUSTRY

New ocean routes soon starting. America's fastest-growing industry. Our booklet, "Wings of Commerce," lists over one hundred different occupations in this field, salaries paid, apprenticeships, promotions, how to qualify and apply. Lists all airline companies in U. S., Canada, Mexico, Central and South America. Information is complete. Price 20c postpaid.

CONTINENTAL SALES CO.
Box 344, Dept. 11 Indianapolis, Ind.

Learn Aviation at Home

Complete home study course in Aviation, including Navigation and Meteorology, offered for a limited time for only $49.75, easy terms.

AVIATION EXTENSION SCHOOL
P. O. Box 102
Prescott, Arizona.

Information pamphlets on free Government aviation training.

Army Air Corps Cadets get 300 hours solo flying, with salary, expenses paid. Information pamphlet, How to Apply, 20c. Same information on Navy Flying Training, 20c. Same on Marine Corps, 20c. Information on Army and Navy Schools for Aviation Mechanics, Aero Photographers, 20c. All four for 50c. Pamphlets prepared by Air Corps Veteran.

Continental Sales Co., Box 344, Dept. 11, Indianapolis, Ind.

MODEL AIRPLANES (Ready Built)

FINISHED MODELS

Modern and wartime airplane models built to order. Fine construction; lacquered and rigged properly. Wing-spans 8 inches to 7 inches. Smooth and glossy finish guaranteed. Name your model. Price—$1.25 each. (Seaplanes, amphibians, autogiros, $1.50 each.)

Actual Boeing Model

No C. O. D. orders. Canadian and Foreign duty C. O. D. Satisfaction guaranteed. Please print your name and address.

MUELLER BROS. 28 Peach Street Buffalo, N. Y.

MODEL KITS AND PLANS

PLANS

BIG OFFER

Full size drawing (size 17 x22) 15" flying scale model airplanes. Many unusual features: movable cockpit control detail, etc. 3 for 25c p.p. or 8 for 50c p.p. (Waco Taperwing, Howard Ike, New Monocoupe, Fokker D-7, Douglas Gull Wing, Post & Rogers Plane, Northrop Fighter, Great Lakes Trainer.)

Dealers:—Write for quantity prices.

UNIVERSAL, 139P Emerson Pl., Brooklyn, N. Y.

MODEL AIRPLANES SUPPLIES

Airplane Dope Formulas. Make your own and save money, this Formula and six other valuable formulas only 10 Cents. Complete Details, Specifications and Performance of 85 American Engines, Model, H.P. Price, W.G.T. Disp., manufactures address, only 10 Cents. Tires for the Flea Low Pressure Doenut type $2.00. Tubes 50 Cents. Instruments Dirt Cheap. **Box 30, Schertz, Tex.**

DIE-CAST MACHINE GUNS, BOMBS AND MOTORS

MACHINE GUNS

¾" long Browning	8c
1½" Browning with pin	5c
1⅝" Spandau...pair	15c
2" long Browning	15c
2" long Marlin	15c
1½" Marlin with pin	10c

LEWIS GUNS

1¾" long	15c
3" long	20c

MACH. GUN MOUNT

For 2" guns	5c
¾" Landing Light	5c

DEMOLITION BOMBS

⅞" long with pin	5c
1¼" long	10c
1⅝" long	15c

CONTROL HORNS

¼" long Set of 6	25c
½" long Set of 6	35c

DIE-CAST MOTORS

1" dia. 9 cylinder	25c
1½" dia. 9 cylinder	35c
2" dia. 9 cylinder	50c
1⅛" dia. 3 cylinder	25c

MOTOR NACELLE

For 1" dia. 9 cyl. motor 10c

PROPELLERS

2 BLAD.		2 BLAD.		3 BLAD.	
2" ST	10c	2¼" SP	15c	1¾" ST	10c
2½" ST	15c	3" SP	25c	2" ST	15c
3" ST	20c	4" SP	35c	2¼" ST	15c
4" ST	25c	6" SP	50c	3" ST	25c
5" ST	30c	2" W	15c	4" ST	30c
6" ST	35c	2½" W	20c	5" ST	40c
7" ST	50c	3" W	30c	6" ST	60c
		4" W	40c		

MINIMUM ORDER 25c
No Postage

THE AIRCRAFT & MARINE MODEL CO., Dept. P.A. 5
1449 Flatbush Ave., Brooklyn, N. Y.

Model Air Motor

Motor, ¾"x¾".... $2.00
Tank, 2½"x30"....$3.00
Complete $4.85

S. H. Dobrusin
3310 Roosevelt Rd.
Chicago, Ill.
3c stamp for circular

HURLEMAN ARISTOCRAT
MODEL AIRPLANE MOTOR
¾" Bore, 1" Stroke, 4500 r.p.m.
PRICE $17.50
Light weight Coils—Plugs
Send 3c Stamp for Folder
Mfg. Solely by and Obtainable Only From
WALTER HURLEMAN, INC.
1428 W. Bristol St., Phila., Pa.

PATENTS

PATENT YOUR IDEAS
Send me a sketch or simple model of your invention. SATISFACTORY TERMS. *DO IT NOW!*
FREE Illustrated Literature Confidential Advise
Z. H. POLACHEK
1234 Broadway, N.Y.

Z. H. POLACHEK 1234 BROADWAY PATENTS NEW YORK REG. PATENT ATTORNEY

PATENTS
PERSONAL SERVICE
Let me act as your personal confidential representative in Washington on all your patent problems.
Delays of even a few days in protecting your ideas, or the slightest carelessness in handling your patent papers, may easily be very costly. My personal service assures speedy action and strictest confidence. Send immediately for my free 72-page booklet, "How to Get Your Patent."
L. F. Randolph, 372-E Victor Bldg., Washington, D. C.

FOR SALE OR TRADE
Will sell outright or trade for a licensed two-place lightplane in good condition Patent No. 2,013,495.
The Patent is a newly Patented parachute.
Popular Aviation
Box 200, 608 S. Dearborn St., Chicago, Ill.

MISCELLANEOUS

Now Better Than Ever IMPROVED PYROIL
Different in color, greater in benefit and results. Yet essentially the same product used for years throughout the field of aviation. Proved to cut friction, reduce wear, safeguard parts, improve performance, cut costs. Now dark wine red in color. Write for Free Chart, photomicrographic and report material. Interesting. Important. Mfrd. and Guartd. by Pyroil Co., 954 La-Follette Ave., LaCrosse, Wis., U. S. A.

NEW!! ALL WAVE POCKET RADIO

Fits in any pocket easily. Weighs only 4 ozs. as shown! NO tubes, batteries or electrical connection needed! Nothing to wear out or need replacement—only one moving part. Separates and receives ALL stations with beautiful clear tone by simply hooking to any metal object as desks, beds, telephones, etc. Range up to 100 miles—much greater under good conditions—very little static! Can be used by ANYONE ANYWHERE! Foolproof -- NOT a cheap CRYSTAL outfit! Absolutely complete with midget phone and directions to use on Bicycles, Autos, in offices, hotels, camps, at home, etc. No messy hookups! THESE ARE FACTS! Send only $1.00 and pay postman $1.99 plus postage or send $2.99 (Cash, Money order or Check). Ideal gift. Guaranteed. Order NOW! (Foreign orders 85 cents extra). At Better Dealers. Tinytone Radio Co. Dept. P.A. Kearney, Neb.
$2.99 complete

AIR PILOT!
If you have a pilot license or expect to obtain one, you can't afford NOT to belong to this organization. Send 3c in stamps for A. E. Bulletin. State age.
Membership and Cadet Flight Brochures—35c.
THE AMERICAN ESCADRILLE
"Composed of America's Present and Future Air Pilots."
STATION N. Box 10 N. Y. CITY

MIDGET ELECTRIC RADIO. Wt. only 1⅛ lbs. Real miniature LOUD SPEAKER built in. Size only 3⅛"x5½"x2½" (note picture). Easily carried in any large pocket or in traveling bag. Two Triple bigain tubes. Built in aerial. Tunes in all stations loud and clearly. Ideal second or personal radio. Operates on ANY 110 volt AC or DC current. Kit of parts and diagram for $6.50. COMPLETELY WIRED AND TESTED FOR ONLY $6.98. Send only $3.00 (M. O., Currency or Check) and pay postman $3.98 plus postage on arrival. Guaranteed to operate anywhere.
TINYTONE RADIO CO. Dept. PA-5. Kearney, Nebr.
$6.98 Wired and Tested

For cash sale advertising

CLASSIFIED DEPARTMENT

RATES: 5-cents per word

USED AIRPLANES $50.00 AND UP—"Easy Payments." Literature 10c.—Continental Sales, Box 344. Dept. 11, Indianapolis, Ind.

AMERICAN FLEA—The Little Tri-Trainer. Modern design, standard control, safety upturned wing tips. Build for less than $100.00, including welded steel fuselage. 8 large blue prints, $2.95. Send 10c for more information.—Hibbs, Fort Worth, Texas.

SPECIAL 15" Propellers for Brown, Jr. and similar motors. 3 ply lamination. Price reduced from $3.50 to $1.95.—Hibbs, Fort Worth, Texas.

PHOTOS—Planes, airports. Price and information sent on receipt of three cent stamp. Plant Photos, Jefferson Avenue, East Point, Georgia.

JOIN the Unlicensed Pilots and Aircraft Club of Nebraska. Preserve amateur flying in Nebraska. Our State Aviation Law will ground all unlicensed pilots and practically all unlicensed aircraft. This law is unconstitutional; join our club and let's take this law to the Supreme Court. Membership fee, ten cents. Will exchange membership for the unlicensed pilots and aircraft owners' names in your vicinity.—George Smith, care of 742 Stuart Bldg., Lincoln, Nebr.

BUILD your own Midget car or lightplane from Storms Plans. Engines, air propellers, chains, axles, wheels, at bargain prices. Circulars, 10c.—Storms Aviation Co., 13 Southside, Asheville, N. C.

FILMS DEVELOPED—Any size, 25c coin, including two enlargements. CENTURY PHOTO SERVICE, Box 829, La Crosse, Wis.

MASTER MADE PROPELLERS. Glider motors, $3.95; Harley, $4.95; Heath, $7.50; Harlequin, $9.00; FORDS, $9.95; Velie, $15.50; OX5, $16.00. Practical course in aviation, $498.00 and an airplane FREE. The same plane, two place low wing monoplane, fly away, $698.00.—Standard Aircraft Co. of Texas, Harwood, Texas.

PHOTOGRAPHS—Aviators, Planes, Celebrities, Scenic. All sizes. Sample and price list, 10c.—Ralston Photos, 612 No. Denny, Indianapolis, Indiana.

FOR SALE—One gasoline powered model (Hurleman Aristocrat) Kovel-Grant 3. Highest offer takes it.—Corwin Meyer, 1044 Williams Blvd., Springfield, Illinois.

FOR SALE—Licensed Curtiss Challenger Robin, 185 H.P. in excellent condition, $1,000.00.—C. R. Fritschle, 7700 Country Club Ct., St. Louis, Mo.

BUILD the Heath Parasol this spring, $199.00. Easy to build, easy to fly. A standard airplane, not a novelty. Welded steel fuselage included. Material sold in 12 convenient groups. First group, $11.45. Information, 10c.—HEATH AVIATION COMPANY, Benton Harbor, Michigan.

HEATH MOTOR OWNERS

IMPROVE your HEATH-HENDERSON motor now. New latest high lift camshafts (regular $10.00) $3.95. Counterbalanced crankshafts with extension ready to install, $15.00. Ricardo cylinders, high compression, $12.00 each. Aircraft pistons, newest type standard and oversize, $2.95. High pressure oil pumps, $6.95. Aluminum valve port plugs, set of eight, $5.00, or 75c each. New improved oil baffle plates, eliminate oil blowing, $3.00 a pair. Tachometer fitting assembly, complete, $4.95. New silichrome exhaust valves, $1.50. Streamline dual exhaust stacks, $3.50 pair. Special bronze valve guides for exhaust, 75c. Special valve springs, 20c. High pressure main bearing, 2 halves, $2.95. New connecting rod bearings, $2.50. Special Heath-Henderson spark plugs, 12 for $1.00 or 10c each. New thrust bearings, $1.95. Connecticut spark plug terminals, 10c. Complete materials to convert your Henderson motorcycle engine, Extra Special, $8.95. Propellers, spruce linen tipped, $8.95; birch hardwood metal tipped, $14.95.—Heath Aviation Company, Benton Harbor, Michigan.

PREPUBLICATION OFFER

NEW HEATH MOTOR MANUAL giving history, overhaul data, installation data, complete instructions for best results and use, and parts price list of Heath-Henderson and B-4 motors, profusely illustrated, before publication date of May 1st, 50c; after May 1st, $1.00. This book is invaluable to all Heath motor owners. Save half by ordering immediately. — HEATH AVIATION COMPANY, Benton Harbor, Mich.

READERS' ATTENTION

Two Special Features

OUR June issue will contain two outstanding features of interest to all of our readers. They have been in demand for a long time but this is our first opportunity of presenting them—and both in one issue.

First will be a full-page colored insert printed on heavy enameled paper that will show all the details of the Vought SBU-1 with photographic clarity. This is well worth the price of the magazine alone to our collectors.

Second, will be the first article of a series of articles on the construction of a gas-driven model plane. The articles will be accompanied by fully detailed drawings and with full details and photos.

WATCH FOR THE JUNE ISSUE OF P.A.

WANTED—A light plane, preferably two placed. —Joseph Jerome, 1448 So. Millard, Chicago.

READY BUILT Cleveland 20" flying models, Mister Mulligan, Fokker, etc. Expert construction. $4.25 postpaid.—Werges, 4806 Milents Ave., St. Louis, Mo.

THOMAS MOORIS SCOUT with OX5 for $75. Needs recovering to fly. Or OX5 separately for $50.—William Burke, Baker, Oregon.

GABARDINE HELMETS, 55c; ALTIMETERS, $2.75. Others.—ANDERSON, 504 N. Aurora, Ithaca, N. Y.

FLYING FLEA Planes, Parts—Latest Aluminum Wheels with Tires 16x4, $24 pair. Turnbuckles, 85c dozen. Twin cylinder Motor bargain. Converted Motors with propeller, $100. Flea Planes built, $295, without motor; $395 to $495 complete. Illustrated price lists, Dime.—Bates Aero Works, 4877 Armitage Ave., Chicago.

WANTED—Pair of glider wings. For sale, steel tubing glider fuselage, exceptionally strong built, complete with tail surfaces, two place, dual-controlled, landing wheel, undamaged.—F. A. Grahn, 119 W. State St., Geneva, Ill.

AIR COOLED MOTOR. Build latest air cooled motor from Model A Ford parts. Castings supplied by us at $47.50. Write for particulars.—Hallman Aircraft, 694 E. 7th St., St. Paul, Minn.

"ATTENTION: Complete kits and finished parts for 'Flying Flea' wheels, steel tube fuselages. Best materials on market for light planes. Maytag, Briggs Stratton and small Marine motors for sale. Send 3c for list and information.—McCoy's Aircraft Service, Napoleon, Ohio."

CANADIANS—Motors, Parts, and material for The Flying Flea and other light planes. Send dime for list.—Hoyt's Aviation Supplies, Orillia, Ontario.

6 FOOT Curtiss Robin kit, $1.50 postpaid. Contains full size plan, ready cut ribs, eight sheets colored tissue, cement, dope, etc. Ask us how you can get this kit free.—Woburn Model Airplane Shop, Dept. PBC, Woburn, Mass.

FREE Plans for building beautiful flying Vought Corsair and solid Curtiss Hawk. Send 3c stamp for mailing.—Mercury Model Airplane Co., 1592P Lincoln Place, Brooklyn, N. Y.

WILL PAY CASH for cracked or any condition Lightplanes, also motors and supplies. State fully all information and price. Write at ONCE.—AERO, BOX 164, Pottstown, Penna.

SALE: "Flying Flea" (factory made), has done 5 hours flying; also flown by Clyde Pangborne; ready to fly; view at Flying School, Roosevelt Field, Mineola, $750 cash.—Box 300, Popular Aviation, 608 S. Dearborn, Chicago.

LINCOLN Sportplane 28, Lawrence, Flyaway, $165.00; EAGLEROCK OX5, $150.00; CRAWFORD 2 place 80 LeRhone, Brand New, $195.00; HENDERSON motor $48.00, 2 CYL. Opposed 24 H.P. motor, $50.00; ACETATE DOPE, 95c gal.—AERO, BOX 164, POTTSTOWN, PENNA.

XUM

BARTER AND EXCHANGE

Notices in these columns are confined to trades. Cash sale advertising must be inserted in the Classified Department or in the Buyers' Directory. Notices in the Barter and Exchange columns, three cents per word.

WANTED—OX Robin, licensed, for cash.—L. Clemenson, 480 Edith Ave., Johnstown, Pa.

WILL BUY cracked Barling, N.B.3, or sell, trade, N.B.3 with 65 H.P. LeBlond, Marshall Prop. Excellent condition. P. G. Schaefer, 1233 Marquette St., Davenport, Iowa.

LIGHTPLANE BARGAINS—Sell or Trade; Gypsy Moth, beautiful recover job, Majored, starter, unlicensed, $700. Bull Pup, good shape, licensed, $375. OX-5 Long-wing Eaglerock, unlicensed, $250. Licensable OX-5 Travelair, $400. Cracked Hisso Lincoln, 2200. Factory built Church Mid-wing, uncovered, less motor, $75. Converted Ford, crated, $45. Heath wing, $5 each. Instruments, airwheel casings, communicating sets, CHEAP. Will accept Radios, PA systems, crack-ups, cars, motors, or almost anything in trade. Want Barling, Robin, Arrow Sport, motors, other ships. Cash or trades.—T. L. Kidd, P. O. Box 195, San Antonio, Texas.

WANTED—Lambert Monocoupe, Velie Monoprep or Aeromarine Taylor Cub. Give price and complete dope in first letter.—A. Kuball, Box 598, Dresden, N. Dak.

SZEKELY 45 H.P. wanted for cash or trade. Must be in A-1 condition. Write.—R. G. Shampagne, 4005 Richelieu St., Montreal, Canada.

AIRPLANE WANTED—One or Two Place. Flying Condition. Cash or trade.—Joseph Kacher, 273 Newell, Barberton, Ohio.

FOR SALE OR TRADE—3 Place OX-5 Swallow in perfect condition. Ship just recovered throughout. Motor just majored. Want a licensed lightplane. For Sale or Trade—OX-5 motors and parts, reconditioned and in good shape. Also have Heath.—Frank J. Garrfalo, 36 Vreeland Ave., Hackensack, N. J.

WANTED—1928 or 1929 Swallow three pale fuselage.—Willard Holloway, Fairmont, Ind.

A-1 EAGLEROCK—7 hours since majored. New covering. Licensed. Trade for late light car and cash.—Ivan Pownall, 317 N. Lafayette St., Grand Rapids, Mich.

SELL WACO 9 unlicensed, A-1 condition or trade for Curtiss Junior or similar light plane.—Charles E. Smith, 303 W. Chicago Blvd., Tecumseh, Mich.

QUICK SALE—Model A, practically new with hub and prop. mag. Turns 1800 on ground, $30 or ?—18" airwheels complete, $10. Aircamper wing for What? Want OX Prop. and overhead.—Lofton Stelter, Tyler, Tex., Route 4.

TRADE 1932 RLD Harley with Goulding Sidecar. Machine new last year, 1935 pistons, cylinders, reverse transmission and other things; low mileage. Want Aeronca, Eaglet, Pup, or any light job with approval. Will pay difference if needed.—Bob Gettelman, 5804 Elliott Circle, Milwaukee, Wis.

RACING OUTBOARD—40 m.p.h and over. Motor in excellent condition with many extras. Boat well kept. Special features. WANT Heath Midwing, B-4 motor, or similar ship, in excellent condition. Give details.—Clement C. Parker, 1936 W. Main St., Norristown, Pa.

IRWIN 79 Radial Aircooled Motors, 25-H.P., 60-lbs. weight. Used only 5 hours. IDEAL for Flying Fleas, Heaths, etc. Complete with Propeller and Hub, crated, $75.00. Cash or trade. —T. L. Kidd, Box 195, San Antonio, Texas.

SWAP typewriter for small motor or what have you; also have Low Pressure tires, Magnetos, air speed indicator, compass, 10x3 tires, Brazing and Soldering Outfit, Aluminum light head for Ford A, Turnbuckles, Walter Hinton Course, want Aviation Magazines.—A. Jones, Box 30, Schertz, Texas.

FOR SALE OR TRADE—Heath Converted Henderson motor. In wonderful condition.—Fred Sickler, Rt. 1, Emporia, Kans.

WANT—Flying suit or old parachute; trade Brown Model Engine.—Kimsey Campbell, Copperhill, Tenn.

J-5, OX-5 MOTORS—Wood, steel, propellers, all sizes. Bank & Turns, wobble pumps, oleos, wheels. A-N dope below cost. Austin radiator. Evinrude 20 h.p. outboard. Want parachute or ?.—A. K. Miller, 10 Willard Pl., Montclair, N. J.

WILL SWAP our regular flying or mechanics courses for work and some cash, or what have you? Government Licensed Airplanes and Pilots. A Successful School since 1928.—Iowa Airways School of Aeronautics, Fort Dodge, Iowa.

WEBBERS (O-K) PROPELLERS—No better performance at any price. Beautiful, laminated first grade material. Standard Ford A. Soft wood $12.50, hard $16.00, free crating. OX-5 $22.50 hard wood. All F.O.B. All others correspondingly low. Write for prices on special sizes. Every customer satisfied; your order appreciated. Have pair 26x4 wheels complete. Unused Supreme propeller metal tips for Cirrus 90. Good used prop., fabric tips, suitable for Motorcycle powered sled. Want 4 cyl. Scientilla, tachometer, airwheels, acetylene torch, aircraft material. Send your list.—Marshall D. Webber, R. F. D. No. 3, Jefferson, Ohio.

WANT—Heath parts and blueprints, Tubing, Aluminum, Spruce, Wheels, Supplies. Have trades. Cash.—N. H. Reber, Sugar Grove, Ohio.

TRADE OR SELL—MEAD PRIMARY GLIDER WITH TRAILOR, FOR AVIATION PARTS, CAR, WOOD OR METAL WORKING MACHINERY.—Guy Long, 922 Baldwin, Elkhart, Ind.

FLYING INSTRUCTIONS—Decent Prices! Dual instruction (including radio beam and blind flying), $5.90 per hour; solo, $3.90 per hour. Every student given instruction on three different type ships, three open biplanes and one cabin monoplane. We have no put-puts or so-called light planes. All our ships are government licensed, modern, representative commercial types. Three hundred miles cross-country flying to every student. Learn to fly on the larger type ships and you can fly anything with wings. Living expenses $7.50 per week. Operators at the same field for thirteen years. Our aim: Prices that every student can become a licensed pilot. Automobiles, motorcycles or what have you taken in as part payment on flying time.—New Way Flying System, Bellefonte, Pa.

Piffle Pusher

(*Continued from page* 348)

trol system. In this particular ship, the absence of the longitudinal control is not greatly missed.

With all these component parts constructed, the next step is to assemble the wreckage. The ship is braced entirely by wire—baling wire. For control, the famous *Dep* (*Dep*lorable) system is used. The Professor, in his broken English, told me that this method proved either "most efficient" or "mos' deficient."

Extreme care must be exercised in rigging the ship in order that the finished job will have some suggestion of symmetry or cemetery.

The final step in the construction of the Piffle Pusher is the mounting of the engine. In the Professor's original model (The Derelict I), a P & W Hornet was selected. Piffle, aided by thirty-two associates, pushed the machine out onto his private field in Laramie, Wyo. With the Professor in the cockpit and his associates in a cold sweat, the throttle was thrown wide out. Attempts are being made to verify the report that the motor was last seen over the Bronx.

Out of this experiment, the venerable professor recommends a washing-machine motor of the rural unelectrified variety.

When you have finished this unique machine, you will have learned everything except how to build and fly an airplane.

END.

Our Readers

(*Continued from page* 351)

to have it rebuilt within a short time. It has a span of 25'-0" and weighs 350 pounds. It is powered by a Heath B4.

Mr. Peterson says that he has a friend who owns a Longster, and as they have their own field, they have a lot of sport together. He would like to correspond with fellows who have built their own ship.

Out of Glencoe, Minn., comes glad news of a lightplane built by the brothers Perschau, Vernon and Cyril, as a hobby during their high-school years. It is a Heath design and flew perfectly from the start without the necessity of doing any re-rigging or making any adjustments. It was test-flown last July and has been flying ever since. The writer, Vernon Perschau, test flew it after only two hours previous instruction and his brother Vernon taught himself.

This is just one more case—we hope the Department will take note of the fact—where two boys flew a home-built plane with hardly any difficulty at all and flew it, one with only limited flight training while the other had no previous flight training at all. And to top it off, they learned a lot, had a lot of fun and had no serious accidents.

The Heath-Henderson engine, so he says, flies the plane very well. And they have had no trouble with it. This is sure fine fellows and you are to be congratulated on the job.

END.

Glider Pilot

(*Continued from page* 338)

The glides were of brief duration and none gained over two hundred feet of altitude; however, we did learn to fly the crates. All training was done in P.T.'s as none of the members had attempted to build anything more advanced.

The reason that we have no sailplanes is not the lack of soaring conditions. The main difficulty is in getting a soarer to these thermals. Because of our terrain, all soaring would have to consist of cloud hopping and this requires some means to get into uprising air currents.

Either an airplane tow or else an auxiliary sailplane would have to be used. One such as the auxiliary sailplane that is now being manufactured in England would be ideal for this terrain.

It is likely that we will see more of these powered soarers in the future, for they mean a lot to the boys in districts with a difficult terrain. They cannot be exactly classified under the head of lightplanes, but known as "auxiliary gliders" they may be classified under a broader and more generous license rating than a lightplane.

However, in spite of the adversities, the sport still goes on and in the spring there will be a P.T. and a secondary in commission with two competent men to do the training. With this equipment some enthusiasm should be stirred up for the king of sports.

END.

High-Lights

(*Continued from page 330*)

must have been awful disappointing to Miss Florence Cubitt, queen of the nudists at the San Diego fair, who made a flight from the coast to New York after announcing that she would be wearing a smile when the plane landed. Pilot H. C. Munson, of United Air Lines, carried her, clothes and all, from Chicago to Newark.

* * *

JAMES A. MOLLISON, noted British pilot, was fined ten dollars in Beverly Hills by Judge Cecil Holland. Upon searching through his evening clothes he found that he did not have the "two pounds" and he offered to teach the Judge to fly in lieu of the fine. Judge Holland, no go.

* * *

DID you know that airline hostesses served 275,000 chicken dinners last year and in addition over 85,000 buffet suppers plus 100,000 quarts of beverages.

* * *

PAUL MANTZ, Amelia Earheart's technical adviser, is now busting airplanes for the movie moguls and is doing some of the dangerous flying which your favorite matinee idol appears to do. . . Only a few of the movie crashers still survive, notably Dick Grace and Charlie Stoffer. . . Grace is still cracking them up and has the record of thirty planes and sixty broken bones.

Earl F. Ward of Berwyn, one of the country's pioneer air mail pilots, has become an air traffic policeman as he has been made supervisor for airway traffic control by the Bureau of Air Commerce. Three major airlines, American, Transcontinental and Western Air and United, are planning deluxe summer air transportation with the introduction of new super-equipment. . . Miss Helene Marecke has the distinction of being Chicago's one millionth passenger to arrive at the Municipal Airport. . . Columbia Airlines plans a reorganization and recapitalization. . . British flying officer Tommy Rose added another record to his laurels when he beat the Cape Town to England flight record by 5 hours and 12 minutes. . . His elapsed time was 6 days, 7 hours and 5 minutes.

END.

Ride 'Em, Cowboy

(*Continued from page 347*)

that time. Now why does the thing keep bucking like my old hoss, I ain't even touched it with my spurs. Oh! I'm holding the stick with too tight a grip, am I, and it makes me overcontrol. Well I knew that something was wrong.

What's he pointin' to my left wing for. Sure I can see it. It's just like it was when we left the field. Yes it's a nice wing. Not level. You want me to pull that wing up with a little aileron. Well I'll be doggone. I'm glad a hoss don't have them aileron things. The only time he banks is on the turns and he knows when to do that without having to be made to do them, like this airyplane does. All you have to do on a hoss is to hold on.

Well, I got her level now. Bet that airyplane feller thinks I am not so dumb after all. What's he want now—— Doggone. I turned out over the lake when I leveled that wing because I used no rudder to compensate for aileron drag. Who woulda thought of that? Airyplane turned around just because I didn't give her a little rudder. These airyplanes is just like a red headed girl. You can't tell what they are going to do. I'm glad a hoss ain't like that. He don't go running to one side just because he gets a little aileron and don't get any rudder. All he wants is a little oats and grass. His controls are always co-ordinated. Why if they wasn't he never would catch a cow.

Just wait until I get astride my old hoss's fuselage and I'll show him some real navigating.

END.

K-G GAS MODEL PLANS

Complete 7-view drawings and full instructions on how to build Joe Kovel's record-breaking gasoline-powered model airplane now available in 1 unit, 22½"x29½". Easy to follow. No cutting or re-arranging of plans necessary. All materials needed in building the ship are listed on the reverse side. Actual size reprints from the April '35 and May '35 issue of MODEL AIRPLANE NEWS.

Prepare now for the 1936 National Meet—it begins June 30th! Start building your record-breaker **this month.** The supply is limited! The demand is great! Order your plans now! Only **50c** postpaid anywhere.

MODEL AIRPLANE NEWS
Suite 925, 551-5th Ave., New York

MODEL THOMPSON SUB MACHINE GUN $3.00
Actual size construction kit, machined barrel, magazine, necessary hardware and working plans.....$3.00
Colt calibre .45 automatic pistol..... 1.00
Colt calibre .25 automatic pistol..... .50
Savage calibre .32 auto. pistol with mach. barrel.... .75
Luger auto. pistol cal. 9M/M w/4" mach. barrel.... 1.75
Colt single action Frontier revolver with machined cylinder, rod ejector and 4¾" barrel..... 1.45
Half size THOMPSON SUB MACHINE GUN kit... 1.50
These handsome kits are semi-finished, cut to outline and do not require the use of any special tools. Postpaid in U. S. A. No stamps, please. Checks 15c extra.

GUN MODEL CO., Dept. K.
2908 N. Nordica Ave., Chicago, Ill.

Corben Super Ace
½" Flying Scale Model Wingspan, 13.6", Lgth. 10.25". Wgt. ½ oz. Colors: Yellow and Black. Designed for easy construction and marvelous flights. Complete kit plus 10c p.p..... **25c**
Also Monocoupe and Taylor Cub.

Fokker D-7
½" Solid Exhibition Model W'span, 14.25". Lgth., 11.40". Colors: Red and White, Black Insignia.
This large true scale de luxe model makes a prize winner in any competition. Complete kit plus 10c p.p..... **50c**
Also Boeing P-26A & Army Hawk.

Build and Fly Models with NATIONAL Reputation

Model builders everywhere are of the same opinion about the excellent qualities of National Models. No wonder they have attained such a fine National reputation. There's perfection, authentic design and detail in every price range. (Prices from 25c to $5.00 at your dealer or send direct.)

Send 5c for New Bulletin and illustrated price list of new Kits and Supplies.

DEALERS! AGENTS! Write at once for dealer discounts and full details about the famous National Line.

NATIONAL MODEL AIRCRAFT & SUPPLY CO.
23 Avenue E - Dept. PA6
New Rochelle, N. Y.

GAS MOTOR DRIVEN SCALE MODELS

82" NEW LOCKHEED ARMY SPEED VEGA, 1/5 H.P.

All Parts Ready Cut Out

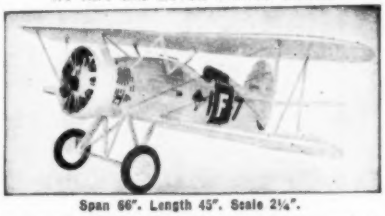
N E W

N E W

82" Span. Length 54⅓". 2" Scale. Weight 5½ lbs. with motor

This is an exact scale model of the latest Army Vega, beautifully streamlined. A special de luxe flying gas model with all formers, wing ribs, lips, wheel pants, already cut out and notched. Turned balsa motor front, 4½" pneumatic air wheels, silk covering, army blue and yellow dope, glue, etc. Model has removable wing, and is specially designed for gas motor. It is very strong, practically crashproof—there being no exterior parts or struts to break. Takes off in 30 foot run, flies over 1 mile on ¼ oz. of gasoline. Const. set, complete without motor, postpaid $25.00

5½ Foot BOEING F4B4
1/5 H.P. GAS MOTOR DRIVEN MODEL

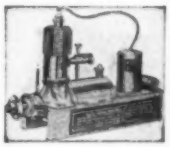


Span 66". Length 45". Scale 2¼".

Specially built model with all parts ready cut out such as formers, wing, ribs, etc., silk covering, 6" wheels, special 10" turned balsa cowl and motor unit, silver dope, glue, etc., 2 full size scale drawings. Const. set without motor, postpaid $25.00

1/5 H. P. GAS MOTOR
Weight as shown, 12 oz.

Long life motor has steel cylinder and piston, ⅞" bore x 1" stroke. Comes complete with gas tank, coil, condenser batteries. Price ready to run, complete, postpaid. Only **$22.50**



Motor comes mounted as shown. 15" or 19" laminated prop. for motor.....$2.75

THIS MOTOR IS USED ON MODELS SHOWN

Send 3c Stamp for Illustrated Catalog

MINIATURE AIRCRAFT CORP., 83 LOW TERRACE NEW BRIGHTON, N. Y.